



AD-A279 030

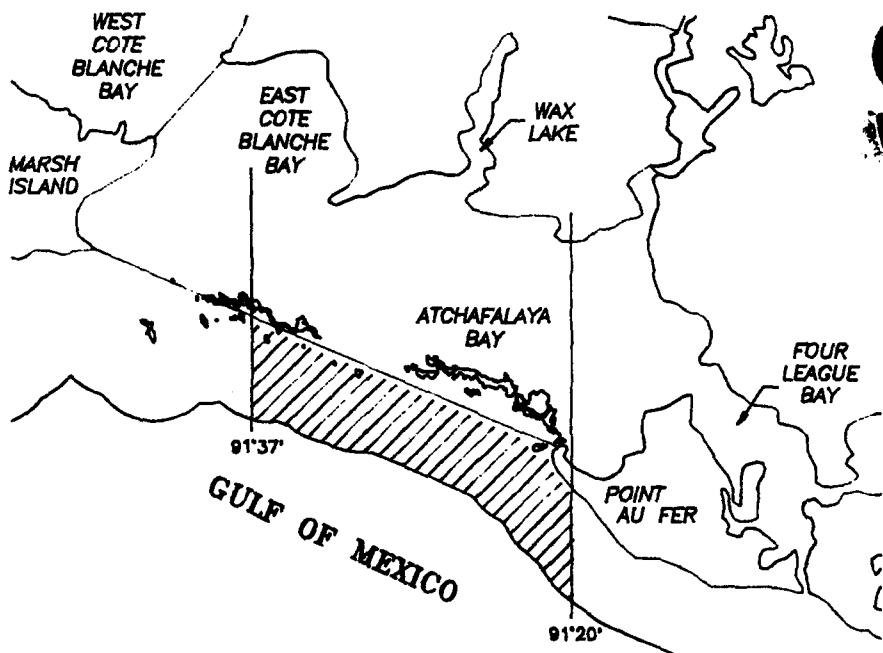
(2)

US Army Corps
of Engineers
New Orleans District

OYSTER SHELL DREDGING
IN GULF OF MEXICO WATERS,
ST. MARY AND TERREBONNE PARISHES,
LOUISIANA

DTIC
SELECTED
MAY 06 1994
S B D

94-13606



FINAL ENVIRONMENTAL IMPACT STATEMENT
AND APPENDIXES

APRIL 1994

DTIC QUALITY INSPECTED 1

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

94 5 05 092

Oyster Shell Dredging In
Gulf of Mexico Waters, St. Mary
and Terrebonne Parishes, Louisiana

U.S. Army Corps of Engineers
New Orleans District

Final Environmental Impact
Statement

April, 1994

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
<i>Performance</i>	
By	Distribution
Availability Codes	
Distr	Avail and/or Special
A-1	

TABLE OF CONTENTS

	<u>Page</u>	
S.	SUMMARY.....	S-1
S.1.	DESCRIPTION OF THE PROPOSED ACTION.....	S-1
S.2.	SUMMARY OF MAJOR ALTERNATIVES.....	S-4
S.3.	SUMMARY OF ENVIRONMENTAL IMPACTS.....	S-4
S.3.1.	Summary of Endangered Species Impacts.....	S-4
S.3.2.	Summary of Physical Impacts.....	S-5
S.3.2.1.	Shell Resources.....	S-5
S.3.2.2.	Summary of Geological Impacts.....	S-5
S.3.2.3.	Summary of Hydrological Impacts.....	S-6
S.3.2.4.	Summary of Water Quality Impacts.....	S-6
S.3.3.	Summary of Biological Impacts.....	S-7
S.3.3.1.	Algae and Phytoplankton.....	S-8
S.3.3.2.	Fisheries/Nekton.....	S-8
S.3.3.3.	Benthos.....	S-8
S.3.4.	Summary of Economic and Social Impacts.....	S-9
S.3.4.1.	Economic Environment.....	S-9
S.3.4.2.	Social Environment.....	S-10
S.3.4.3.	Cultural Resources/Archeology.....	S-10
S.3.4.4.	Recreational Resources.....	S-11
S.3.5.	Summary of Cumulative Impacts.....	S-11
S.4.	SUMMARY OF MITIGATION MEASURES.....	S-12
S.5.	SUMMARY OF JUDICIAL REQUIREMENTS.....	S-13
1.	PURPOSE AND NEED FOR THE PROPOSED ACTION.....	EIS-1
1.1.	STATEMENT OF PURPOSE AND NEED.....	EIS-1
1.2.	HISTORY OF SHELL DREDGING IN COASTAL LOUISIANA.....	EIS-4
1.3.	SHELL DREDGING TECHNIQUES.....	EIS-4
1.3.1.	Introduction.....	EIS-4
1.3.2.	Exploration.....	EIS-5
1.3.3.	Extraction Operations.....	EIS-6
1.3.4.	Processing.....	EIS-8
1.3.5.	Transportation & Handling.....	EIS-8
2.	ALTERNATIVES.....	EIS-10
2.1.	INTRODUCTION.....	EIS-10
2.2.	DESCRIPTION OF ALTERNATIVES.....	EIS-10
2.2.1.	No Action.....	EIS-10
2.2.1.1.	Alternative Materials.....	EIS-11
2.2.1.1.1.	Shell.....	EIS-11
2.2.1.1.2.	Limestone.....	EIS-13
2.2.1.1.3.	Gypsum Waste.....	EIS-13
2.2.1.1.4.	Spent Bauxite.....	EIS-14
2.2.1.1.5.	Sand.....	EIS-14
2.2.1.1.6.	Others.....	EIS-15
2.2.2.	Alternative Permit Restrictions.....	EIS-16
2.2.3.	Issue Permits with Additional Restrictions.....	EIS-16
2.2.3.1.	Additional Restrictions on Dredging Intensity.....	EIS-17

TABLE OF CONTENTS
(continued)

	<u>Page</u>
2.2.3.2. Additional Restrictions on Dredging Discharge.....	EIS-17
2.2.4. Issue Permit with Reduced Restrictions.....	EIS-18
2.2.4.1. Reduced Restrictions on Areas Available for Dredging.....	EIS-18
2.2.4.2. Reduced Restrictions on Dredging Intensity.....	EIS-18
2.2.4.3. Reduced Restrictions on Dredge Discharge.....	EIS-19
2.3. ALTERNATIVES CONSIDERED IN DETAIL.....	EIS-19
2.4. COMPARATIVE IMPACTS OF ALTERNATIVES.....	EIS-19
 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES.....	EIS-25
3.1. INTRODUCTION.....	EIS-25
3.2. LOCATION AND ENVIRONMENTAL SETTING OF THE PROPOSED ACTIVITY.....	EIS-25
3.2.1. Project Area Description.....	EIS-25
3.3. GEOLOGICAL SETTING.....	EIS-27
3.3.1. Geologic History.....	EIS-27
3.3.2. Physiographic Features.....	EIS-28
3.3.3. Subsidence and Land Loss.....	EIS-29
3.3.3.1. Existing Conditions.....	EIS-29
3.3.3.2. Impacts of Alternatives.....	EIS-35
3.3.4. Holes and Troughs.....	EIS-36
3.3.4.1. Existing Conditions.....	EIS-36
3.3.4.2. Impacts of Alternatives.....	EIS-46
3.4. MINERAL RESOURCES.....	EIS-47
3.4.1. Existing Conditions.....	EIS-47
3.4.2. Impacts of Alternatives.....	EIS-52
3.5. HYDROLOGY AND WATER QUALITY.....	EIS-52
3.5.1. Introduction.....	EIS-52
3.5.2. Existing Conditions of Water Column/Sediment Quality.....	EIS-53
3.5.3. Impacts of Alternatives.....	EIS-62
3.6. BIOTIC ENVIRONMENT.....	EIS-66
3.6.1. Botanical Resources.....	EIS-66
3.6.1.1. Algae and Phytoplankton.....	EIS-66
3.6.1.1.1. Existing Conditions.....	EIS-66
3.6.1.1.2. Impacts of Alternatives.....	EIS-67
3.6.2. Zoological Resources.....	EIS-68
3.6.2.1. Fisheries/Nekton.....	EIS-68
3.6.2.1.1. Existing Conditions.....	EIS-68
3.6.2.1.2. Impacts of Alternatives.....	EIS-72
3.6.2.2. Benthos.....	EIS-73
3.6.2.2.1. Existing Conditions.....	EIS-73
3.6.2.2.2. Impacts of Alternatives.....	EIS-77

TABLE OF CONTENTS
(continued)

	Page
3.6.2.3. Oyster Reefs.....	EIS-78
3.6.2.3.1. Existing Conditions.....	EIS-78
3.6.2.3.2. Impacts of Alternatives.....	EIS-79
3.6.2.4. Refuges and Wildlife Management Areas.....	EIS-80
3.6.2.4.1. Existing Conditions.....	EIS-80
3.6.2.4.2. Impacts of Alternatives.....	EIS-81
3.6.2.5. Endangered and Threatened Species.....	EIS-81
3.6.2.5.1. Existing Conditions.....	EIS-81
3.7. SOCIOECONOMIC ENVIRONMENT.....	EIS-82
3.7.1. Business and Industrial Activity.....	EIS-82
3.7.1.1. Existing Conditions.....	EIS-82
3.7.1.2. Impacts of Alternatives.....	EIS-86
3.7.2. Employment/Labor Force/Displacement of People.....	EIS-88
3.7.2.1. Existing Conditions.....	EIS-88
3.7.2.2. Impacts of Alternatives.....	EIS-93
3.7.3. Property Values.....	EIS-95
3.7.3.1. Existing Conditions.....	EIS-95
3.7.3.2. Impacts of Alternatives.....	EIS-95
3.7.4. Public Facilities, Services and Transportation.....	EIS-96
3.7.4.1. Existing Conditions.....	EIS-96
3.7.4.2. Impacts of Alternatives.....	EIS-99
3.7.5. Tax Revenues.....	EIS-101
3.7.5.1. Existing Conditions.....	EIS-101
3.7.5.2. Impacts of Alternatives.....	EIS-102
3.8. SOCIAL ENVIRONMENT.....	EIS-104
3.8.1. Aesthetic Values.....	EIS-104
3.8.1.1. Existing Conditions.....	EIS-104
3.8.1.2. Impacts of Alternatives.....	EIS-105
3.8.2. Archeology/Cultural Resources.....	EIS-105
3.8.2.1. Existing Conditions.....	EIS-105
3.8.2.2. Impacts of Alternatives.....	EIS-107
3.8.3. Desirable Regional and Community Growth.....	EIS-109
3.8.3.1. Existing Conditions.....	EIS-109
3.8.3.2. Impacts of Alternatives.....	EIS-109
3.8.4. Community Cohesion.....	EIS-110
3.8.4.1. Existing Conditions.....	EIS-110
3.8.4.2. Impacts of Alternatives.....	EIS-111
3.8.5. Noise.....	EIS-112
3.8.5.1. Existing Conditions.....	EIS-112
3.8.5.2. Impacts of Alternatives.....	EIS-112
3.8.6. Recreation.....	EIS-114
3.8.6.1. Existing Conditions.....	EIS-114
3.8.6.2. Impacts of Alternatives.....	EIS-115

TABLE OF CONTENTS
(continued)

	<u>Page</u>	
4.	CUMULATIVE IMPACTS.....	EIS-115
4.1.	INTRODUCTION.....	EIS-115
4.2.	SEWAGE.....	EIS-116
4.3.	URBAN AND AGRICULTURAL RUNOFF.....	EIS-116
4.4.	IMPACTS OF SHRIMPING.....	EIS-117
4.5.	IMPACTS OF OTHER PERMITTED ACTIVITIES.....	EIS-119
4.6.	IMPACTS OF CORPS OF ENGINEERS CIVIL WORKS PROJECTS.....	EIS-119
4.7.	COMPREHENSIVE OVERVIEW OF CUMULATIVE IMPACTS.....	EIS-122
4.7.1.	Physical-Chemical Impacts.....	EIS-123
4.7.2.	Biological Impacts.....	EIS-124
4.7.3.	Socio-Economic Impacts.....	EIS-125
5.	LIST OF REVIEWERS AND PREPARERS.....	EIS-126
5.1.	PREPARERS.....	EIS-126
5.2.	REVIEWERS.....	EIS-127
6.	PUBLIC INVOLVEMENT.....	EIS-130
6.1.	PUBLIC INVOLVEMENT PROGRAM AND STUDY HISTORY.....	EIS-130
6.2.	REQUIRED COORDINATION ON DRAFT EIS.....	EIS-130
6.3.	STATEMENT RECIPIENTS.....	EIS-131
7.	LITERATURE CITED.....	EIS-137

LIST OF TABLES

	<u>Page</u>	
TABLE 1	COMPARISON OF ALTERNATIVE MATERIALS & USES.....	EIS-12
TABLE 2	COMPARATIVE IMPACTS OF ALTERNATIVES.....	EIS-20
TABLE 3	CHARACTERISTICS OF DREDGE CUTS FILLING FOR ATCHAFALAYA BAY AND FOUR LEAGUE BAY.....	EIS-44
TABLE 4	OYSTER SHELL PRODUCTION AND ROYALTY AND SEVERANCE TAXES PAID BY DRAVO 1975-1991.....	EIS-50
TABLE 5	WATER USES AND STANDARDS.....	EIS-54
TABLE 6	SELECTED CONSTITUENTS OF SEDIMENTS ALONG ATCHAFALAYA BAY NAVIGATION CHANNEL.....	EIS-59
TABLE 7	RESULTS OF TRAWL SAMPLING NOVEMBER 14, 1990 ZONES 8 AND 9.....	EIS-71
TABLE 8	RESULTS OF BENTHOS SAMPLING FROM SELECTED STUDY AREAS (GSRI, 1977) ZONES 8 AND 9.....	EIS-75

LIST OF TABLES
(continued)

	Page
TABLE 9 CIVILIAN LABOR FORCE FOR LOUISIANA AND THE PROJECT AREA 1980 TO 1991 (THOUSANDS).....	EIS-89
TABLE 10 UNEMPLOYMENT RATE FOR LOUISIANA IN THE SURROUNDING AREA 1980 TO 1991.....	EIS-90
TABLE 11 LABOR FORCE AND EMPLOYMENT BY INDUSTRY 1990.....	EIS-91

LIST OF FIGURES

	Page
FIGURE 1 APPLICANT'S PROPOSED AREA.....	EIS-2
FIGURE 2 DIAGRAMMATIC SKETCH OF DREDGING OPERATION.....	EIS-7
FIGURE 3 SCHEMATIC OF SHELL PROCESSING.....	EIS-9
FIGURE 4 RATE OF LOUISIANA SHORELINE CHANGE.....	EIS-34
FIGURE 5 DREDGE CUT SURVEY LOCATIONS.....	EIS-38
FIGURE 6 SHELL DREDGE CUT SURVEY ATCHAFALAYA BAY NEAR WAX LAKE OUTLET.....	EIS-39
FIGURE 7 SIGNIFICANT OYSTER SHELL SITES WITHIN APPLICANT'S PROPOSED AREA.....	EIS-48
FIGURE 8 MINERAL RESOURCES OF THE PROJECT AREA.....	EIS-51
FIGURE 9 PRE-CHANNEL DREDGING BOTTOM SEDIMENT DATA ATCHAFALAYA BAY NAVIGATION CHANNEL.....	EIS-60
FIGURE 10 LOCATIONS OF TRAWL SAMPLES NOVEMBER 14, 1990.....	EIS-70
FIGURE 11 GSRI BENTHIC SAMPLE STATION LOCATIONS.....	EIS-74
FIGURE 12 SOUND LEVELS OF VARIOUS ACTIVITIES.....	EIS-113

LIST OF APPENDIXES

APPENDIX A	SUPPLEMENTAL INFORMATION SHELL DREDGING PERMIT APPLICATION
APPENDIX B	SHELL DREDGING EQUIPMENT DRAWINGS AND SPECIFICATIONS
APPENDIX C	SAMPLE LOCATIONS AND LABORATORY TEST RESULTS OF BOTTOM SEDIMENTS SAMPLED JANUARY, 1987
APPENDIX D	FISHES FOUND IN MARSHES AND WATER BODIES OF LOUISIANA COASTAL ZONE (GOSSELINK, 1984; GOSSELINK ET AL., 1979)
APPENDIX E	ASSESSMENT OF PROJECT IMPACTS ON ENDANGERED SPECIES
APPENDIX F	COMMENTS RECEIVED AND COMMENT RESPONSES

FINAL ENVIRONMENTAL IMPACT STATEMENT
Oyster Shell Dredging in Gulf of Mexico Waters
St. Mary and Terrebonne Parishes, Louisiana

The responsible lead agency is the U.S. Army Engineer District, New Orleans, Louisiana.

The action being considered is the issuance of permits under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act to Louisiana Dredging Company for the dredging of buried shell deposits from the beds of portions of the nearshore Gulf of Mexico (GOM) within three miles of the coast in St. Mary and Terrebonne Parishes.

Abstract: Shell dredged from bays along the central Louisiana Coast has historically provided an economical source of relatively low cost construction aggregate, as well as a source of calcium carbonate. The purpose of this document is to determine the environmental consequences of shell dredging in the nearshore GOM waters within the three mile territorial limit. Two alternatives were considered in detail. These alternatives include no action and the proposal to remove shell in portions of the nearshore GOM.

SEND YOUR COMMENTS TO THE DISTRICT ENGINEER BY: May 16, 1994

ADDRESS: District Engineer
 ATTN: CELMN-PD-RS
 U.S. Army Engineer District
 P. O. Box 60267
 New Orleans, Louisiana 70160-0267

If you would like further information on this document, please contact Mr. Robert Bosenberg, Planning Division, U.S. Army Engineer District, P. O. Box 60267, New Orleans, Louisiana 70160-0267, (504) 862-2522.

S.

SUMMARY

S.1. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is issuance of Federal permits that would authorize dredging and dredged material depositions in an area of the nearshore Gulf of Mexico (GOM) that is within the territorial waters of the United States. The applicant's purpose is to perpetuate the supply of buried oyster shell for commercial uses.

Permits would be issued under Section 10 of the Rivers and Harbors Act of March 3, 1899 (30 Stat. 1151; 33 USC 403) and Section 404 of the Clean Water Act (86 Stat. 816; 33 USC 1344). The project area is the nearshore GOM waters generally extending seaward from East Cote Blanche and Atchafalaya Bays to the three mile limit, and bounded by Longitude 91° 20' in the East and Longitude 91° 37' in the West. The restricted areas within this project area are given in Appendix A in the listing of the Louisiana Department of Natural Resources restrictions. The conditions for operations which formed a basis for the permit application by Louisiana Dredging Company are also given in Appendix A. The permit application by Louisiana Dredging Company and the conditions to that permit application form the basis for the USACOE analysis in this EIS.

The U.S. Army Corps of Engineers - New Orleans District is evaluating the permit request. The evaluation includes a public interest review. Preparation of this environmental impact statement and our consideration of the comments received about it are part of that public interest review. When the evaluation is complete, the District Engineer can issue or deny a permit. Permits, sometimes including special conditions, are issued for activities that are not contrary to the public interest and pass a Section 404 (b) (1) guidelines review. Permits are denied for activities that are contrary to the public interest and/or fail a Section 404 (b) (1) guidelines review.

Shell dredging in Louisiana's coastal bays has been ongoing since 1914. Over the years, uses for shell have expanded. Today, shell is used to construct roadway bases, levees, parking lots, roads, and drilling barge pads. Shell is also a valuable substrate for oyster cultch, a source of calcium carbonate for limestone production, and is used in chicken feeds, pharmaceuticals, and to control smoke stack emissions. Industry and institutional studies indicate that shell is particularly suited for use as a light weight aggregate for road bed construction in poor load-bearing soils that are common in south Louisiana.

During the nearly 80-year history of shell dredging in inshore coastal waters, shell production rates fluctuated between 0.3 million cubic yards (MCY) and 1.5 MCY until the early 1950's when demand increased sharply to a peak of 5 MCY by 1965. Annual production has since declined to less than 2 MCY by 1991 and to only 350,600 MCY in 1992. Factors influencing production rates include economic fluctuations along the Gulf Coast, market forces making alternative materials competitive with shell for some uses and regulation of the industry.

Over the years, numerous spatial restrictions have been imposed to minimize adverse impacts to the environment and reduce conflicts with other groups that use other coastal water resources. Under permit restrictions affecting shell dredging in inshore waters only buried shell (shell deposits or "reefs" that are covered by sediments and, thus, are below the surface of the bay bottom) may be dredged. For the same reason, dredging is prohibited from occurring: 1) where there are any live oysters or within other designated restricted areas which are set aside for wildlife management, sport fishing, and commercial fisheries production; 2) within a mile of any national wildlife refuge; 3) within 1,500 feet of shorelines, oil and gas facilities and pipelines; and, 4) within 1,000 feet of subaerial "reefs" (shells that are above the water line).

The process by which shells are mined today is essentially the same as it has been over the years. Louisiana Dredging Company proposes to continue to use cutter head dredges (two) to acquire the shell. This method will continue to create temporary troughs in water bottoms. Troughs average about 300 feet wide and can be as much as 20 feet deeper than the surrounding water bottom elevation.

Environmental Assessments were prepared by the U.S. Army Corps of Engineers (USACE) in 1982 and 1984 to identify the impacts associated with the removal of buried oyster shell from the inshore and nearshore coastal waters of Louisiana. In April, 1986, the USACE was ordered by the U.S. District Court, Eastern District of Louisiana to prepare an Environmental Impact Statement(s) (EIS)(s) prior to extending or reissuing permits on those areas for which shell dredging permits had been issued (Zones 1-3 and 8 and 9 as shown in Figure 1).

The impacts of shell dredging in Zones 1-3 using cutter head dredges were addressed in a separate Environmental Impact Statement (EIS) titled "Oyster Shell Dredging in Atchafalaya Bay and Adjacent Waters, Louisiana". Shell dredging impacts in portions of Zones 8 and 9 using the same method of dredging as addressed in the previous document are addressed in this document. The current lease let by the Louisiana Wildlife and Fisheries eliminated any reference to dredging zones as described in Figure 1. The boundaries of the area (portions of Zones 8 & 9) under review were set solely by the Louisiana Department of Wildlife & Fisheries. Neither the applicant nor the Corps of Engineers, New Orleans District, has authority to set state lease boundaries. The zone designation has not been deleted to allow us to use the prior data collected and referenced by zones.

Much of the data gathered for this document was for Dravo, the company which held the dredging lease until November, 1991. The lease was awarded at that time to Louisiana Dredging Company. This document has been updated to reflect the post start-up conditions of the equipment, personnel, material prices, royalty, etc. of Louisiana Dredging Company, the current leaseholder.

S.2. SUMMARY OF MAJOR ALTERNATIVES

Two alternatives were investigated in detail. These are:

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

S.3. SUMMARY OF ENVIRONMENTAL IMPACTS

S.3.1. Summary of Endangered Species Impacts

An Endangered Species Assessment (Appendix E) was prepared following coordination with the required Federal agencies. Five species were identified with the potential of being impacted by shell dredging activities. National Marine Fisheries Service concurs with the findings that shell dredging in the nearshore GOM will not impact sea turtles or their critical habitat.

S.3.2. Summary of Physical Impacts

S.3.2.1. Shell Resources

The surface areas of the portions of Zones 8 and 9 evaluated for shell dredging (Figure 1) comprise approximately 56,556 total acres with approximately 51,272 acres of that unrestricted to dredging. Current estimates of the proven shell resources in this area based on 1984-1986 shell surveys, the most recent surveys conducted (Dravo, pers. comm.) estimate about 17 to 26 MCY of reserves based on current permit restrictions. Based on an annual production rate of approximately 1.6 to 1.7 MCY and the fact that all shell cannot be recovered, the estimated shell reserves of those portions of Zones 8 and 9 included with the current state lease, could provide 5 to 8 years of dredging activity. The preceding proven reserve estimates are based on gross surveys of the nearshore Gulf regions by industry geologists.

S.3.2.2. Summary of Geological Impacts

Shell dredging in the project areas will have no adverse impact on the oil, gas, sand, gravel, salt, sulfur and lime resources. The dredging of shell will allow the commercial utilization of shell resources. The removal of buried shell would have no reasonably foreseeable adverse impact on land loss or erosion.

Troughs created by previous shell dredging fill at variable rates. The rate of fill depends on the location of the trough, type and grain distribution of the soil, hydrologic conditions, area river flows, wind and tide actions, currents and storms; however, there is indication from data gathered in Atchafalaya Bay that the filling is fairly rapid. (See Geology section of this EIS.) Because of the considerable distances of the proposed dredging zones from the shore, shell dredging is not expected to have any impact on the building of deltas in Atchafalaya Bay.

The depth and overall bathymetry of the nearshore GOM are affected over a geographic scale significantly larger than the proposed project area by very large natural sediment transport/movement dynamics of the Mississippi and Atchafalaya Rivers as well as the GOM. The extraction of shell is therefore not expected to have any significant impact on shoreline accretion.

The extraction of buried reef shell will have no effect on sea level rise or subsidence.

S.3.2.3. Summary of Hydrological Impacts

The hydrological impacts of shell dredging in the coastal areas and bays are temporary and minimal. Troughs and holes fill in within a few years, as documented from past dredging activities. Because of their irregular location and orientation and the fact that they don't form an interconnected network, the troughs and holes will have no significant adverse effect on overall flow regimen.

S.3.2.4. Summary of Water Quality Impacts

The major water quality impact of shell dredging is the localized temporary elevation of turbidity and suspended solids. The elevated levels occur a few hundred feet down-current from the dredge and then dissipate rapidly. These high turbidity levels can average about 300 NTU with highs in the range of 2000 NTU while high total suspended solids (TSS) levels can exceed 4000 mg/l with averages in the range of about 650 mg/l. Natural background turbidity and solid levels range up to several hundred milligrams per liter. Therefore, dredging related increases in turbidity levels and suspended solids are not anticipated to have a significant adverse effect on the project areas water quality.

The temporary holes and troughs resulting from shell dredging may occasionally experience some stratification with a more saline and denser layer of water trapped near the bottom and the less saline and lighter layer near the surface. During the summer months this may, at times, cause reduced bottom dissolved oxygen levels in the troughs which would tend to repel fish. On the other hand, in the winter the bottom areas of the troughs would be warmer than the surrounding water column, which would tend to attract fish. This impact would be lessened for troughs farther offshore because of higher normal water column salinities. The likelihood of stratification is quite small because offshore areas are a higher energy system with a subsequent greater propensity to mix.

Shell dredging is not expected to cause a significant impact to water quality by reintroducing toxic contaminants. Elutriate samples from along the Atchafalaya Bay Navigation Channel and adjacent to the project area show that little of the contaminants in the bottom sediments are released back into the water column. Along this channel, sediment contaminant loads would be expected to be the highest overall of the entire central coast.

S.3.3. Summary of Biological Impacts

The impacts addressed herein are those which result from the use of a cutter head dredge to remove shell reefs which are totally buried below the mud line of the water bottom. Shell dredging creates trenches that average 300 feet in width and that can be 17 to 22 feet below the bottom, which is as deep as some shell deposits.

S.3.3.1. Algae and Phytoplankton

Shell dredging resuspends nutrients leading to possible temporary increases in phytoplankton. This environment may be plentiful enough to minimize the impact of these increases. Shell dredging also produces localized increases in turbidity levels which may decrease light penetration to phytoplankton. However, these turbidity effects are highly localized and dissipate rapidly.

S.3.3.2. Fisheries/Nekton

Nekton in the coastal waters are necessarily adapted to high turbidity and are subjected to it on a seasonal basis. Coastal shell dredges directly disturb approximately one acre of water bottom per dredge per operating day. During the dredging, localized turbidity level increases, which are limited to several hundred feet downstream of the dredge, may cause mobile species to avoid the area temporarily. The total area impacted by a turbidity plume 200 feet in radius is 2.9 acres at any one time per operating dredge. Therefore, dredging induced increases in turbidity levels are not expected to significantly affect nekton populations.

S.3.3.3. Benthos

Benthic organisms are temporarily eliminated in the area dredged. Benthos may also be affected by sedimentation in areas immediately adjacent to the dredging operations even though most of the dredged bottom sediments are returned to the trench. The area of benthic habitat directly disturbed is approximately 1 acre per dredge per day. Assuming an area 200 feet in radius is subject to siltation, the area damaged is approximately 2.9 acres per dredge in extent or about 5.8 acres for two dredges operating simultaneously. This constitutes 0.011% of the total area open to dredging in those portions of Zones 8

and 9 for which a permit is sought. Populations of benthos begin to recolonize bottom substrate quickly by virtue of their eurytolerant and opportunistic nature. Recolonization may be complete in a matter of months or may require up to two years although diversity may not fully recover in that time.

Live oyster beds occur in the project area only during years of a proper balance of fresh water and salt water. Previous restrictions on shell dredging include no dredging within 1,000 feet of exposed (subaerial) reefs. Because data taken around an operating dredge found that elevated turbidity occurs less than 1,000 feet downcurrent of the dredge, living oyster resources would not be adversely impacted by shell dredging in the project area.

S.3.4. Summary of Economic and Social Impacts

S.3.4.1. Economic Environment

One beneficial impact of shell dredging in the proposed area would be the continued availability of shell for construction and maintenance of highways, roads, and levees in southern Louisiana. The applicant estimates there are about 3 MCY of reserves in the inshore bays where dredging occurs now and that about 17 to 26 MCY of reserves occur in the area for which a permit is being sought. Another would be continued employment. Currently, shell dredging operations in Atchafalaya and East Cote Blanche Bays directly support 105 jobs directly and 315 jobs indirectly. A third benefit would be that the State of Louisiana would continue to receive royalties and severance taxes.

S.3.4.2. Social Environment

Employment opportunities and income generated both directly and indirectly from the shell dredging industry would contribute to continued community growth. In this manner permit issuance would have positive impacts on the social well-being of communities in the area for a period of 5 to 8 years.

Shell dredging results in increased noise levels on or near an operating dredge. Noise related impacts primarily affect those people employed in the industry.

S.3.4.3. Cultural Resources/Archaeology

The permit area is considered a high probability zone for the occurrence of historic period shipwrecks. There is also the potential for inundated prehistoric sites; however, this possibility is less likely. Cutter head dredging operations could damage or destroy historic shipwrecks that have settled on top of shell deposits. To safeguard those resources, surveys to identify endangered shipwrecks and provide necessary information to avoid these sites before areas are shell dredged. These are an obligation under the current Coastal Use Permit. Such a condition requires the advance survey of an area and the submission of those survey results would be submitted to the State Historic Preservation Officer for review and comment before dredging. This voluntary commitment could be made a special condition to any permit that may be issued and would be in addition to the preprinted condition in Department of the Army permits that requires permittees to cease activities and notify the proper authorities when artifacts are encountered.

S.3.4.4. Recreational Resources

Shell dredging would have minimal impacts upon the recreational resources of the area. The industry has no effect on state parks, wildlife refuges, and beach areas which are protected by federal and state restrictions.

S.3.5. Summary of Cumulative Impacts

The USACE grants permits for activities in the project area. These projects are primarily related to the needs of the oil and gas industry (i.e., oil field canals, pipelines, platforms). These actions have various impacts on the water quality, hydrology and biological productivity of the area. The severity of impacts varies with each project.

Shell dredging, marine transportation, oil and gas exploration/production and commercial and recreational fishing all occur within the proposed project area. The natural forces that define and characterize the same area dramatically influence those activities but the activities themselves, either individually or collectively, have not altered the influential natural forces. Issuance of the requested permit would have a favorable social and economic impact because the current social and economic conditions would be prolonged for several years. Therefore, any adverse biological, or beneficial social and economic impacts of the proposed shell dredging activity in the nearshore GOM would be temporary, localized and largely independent of other ongoing activities.

S.4.

SUMMARY OF MITIGATION MEASURES

Mitigation is a collective term used to describe efforts to avoid, minimize, and/or compensate for impacts attributable to an action. In the case of shell dredging, the primary methods of mitigation are avoidance of impacts (by defining no-dredge protective zones) and by minimizing impacts (no more than 2 dredges). Compensation, or off-site mitigation, was imposed by the Louisiana Department of Natural Resources (LDNR) in the 1982 renewal of permits. That requirement states that off-site mitigation would be implemented if recommended by the Secretary of the Louisiana Department of Wildlife and Fisheries (LDWF).

Recommendations for offsite mitigation of possible shell dredging impacts are prescribed under present LDNR regulations. These mitigation measures involve construction of a shell reef, one-foot thick, and one acre in size for every 200,000 cubic yards of material removed. A reef approximately one acre in size has been built in the vicinity of Cypremort Point in West Cote Blanche Bay.

Additionally, Dravo transported and offloaded 7450.26 cubic yards of shell to Rockefeller Refuge under the supervision of the Louisiana Wildlife and Fisheries. This was done at a cost to Dravo of \$36,570, for which the LDWF credits an additional 7314 cubic yards of shell. This mitigation was performed on a voluntary basis by Dravo and was completed in May, 1993.

Louisiana Dredging Company also planted 3521 cubic yards of reef shell in Terrebonne Bay - Point Mast Project - under the supervision of the LDWF in June 1993.

S.5.

SUMMARY OF JUDICIAL REQUIREMENTS

This FEIS assesses the impacts of oyster shell dredging on all significant resources and addresses all issues which surfaced during litigation. In the April 1986 court opinion, the United States District Judge ordered that the coastal area EIS(s) shall, at a minimum, analyze the possible impacts of shell dredging on several areas of concern. These concerns are listed below, accompanied by a description of where and how these items are discussed in the FEIS.

- a. The Emergence of the Atchafalaya Bay Delta - The emergence of the Atchafalaya Bay Delta is of great interest to many individuals, and biological and physical factors which may affect it are discussed at length throughout the EIS and appendixes. Sections 3.3.3.1. and 3.3.3.2. of this EIS, in particular, discuss existing conditions and impacts of shell dredging on the delta. Additional information regarding the impact of holes and troughs on the region are presented in Sections 3.3.4.1 (Existing Conditions) and 3.3.4.2. (Impacts of Alternatives).
- b. Water Quality - Discussions regarding the water quality and the impacts of shell dredging on it are presented in Sections 3.5.2. and 3.5.3. of this document.
- c. Shell Reefs - The potential presence of live oyster reefs in the project area and the impacts of shell dredging on them are addressed in Section 3.6.2.3.1. and 3.6.2.3.2.
- d. Sport Fishing - The impact of shell dredging activities on sport-fishing and other recreational opportunities of the project area is presented in Sections 3.6.2.1.1. and 3.6.2.1.2.

e. Storm Waters in the GOM - The presence of holes and troughs which result from the removal of shell resources are thought by some interested parties to affect the magnitude of storm waters in the GOM. This, in turn, is thought to affect the coastal regions of the project area. The impacts of shell dredging on the hydrology of the project area are discussed in Sections 3.3.3.1.. and 3.3.3.2. of this document.

f. Exhaustion of the Shell Resource - The depletion of fossil shells is discussed in this EIS in Sections 3.4.1. and 3.4.2. The applicant estimates that proven reserves of fossil shells in the unrestricted portions of Zones 2 and 3 are sufficient to sustain dredging at current levels for 1 to 2 years under the current restrictions. However, estimates of these reserves are not exact, and unverified shell is expected within the currently permitted areas. In addition, considerable proven reserves exist in areas which have been closed to shell dredging under current permits.

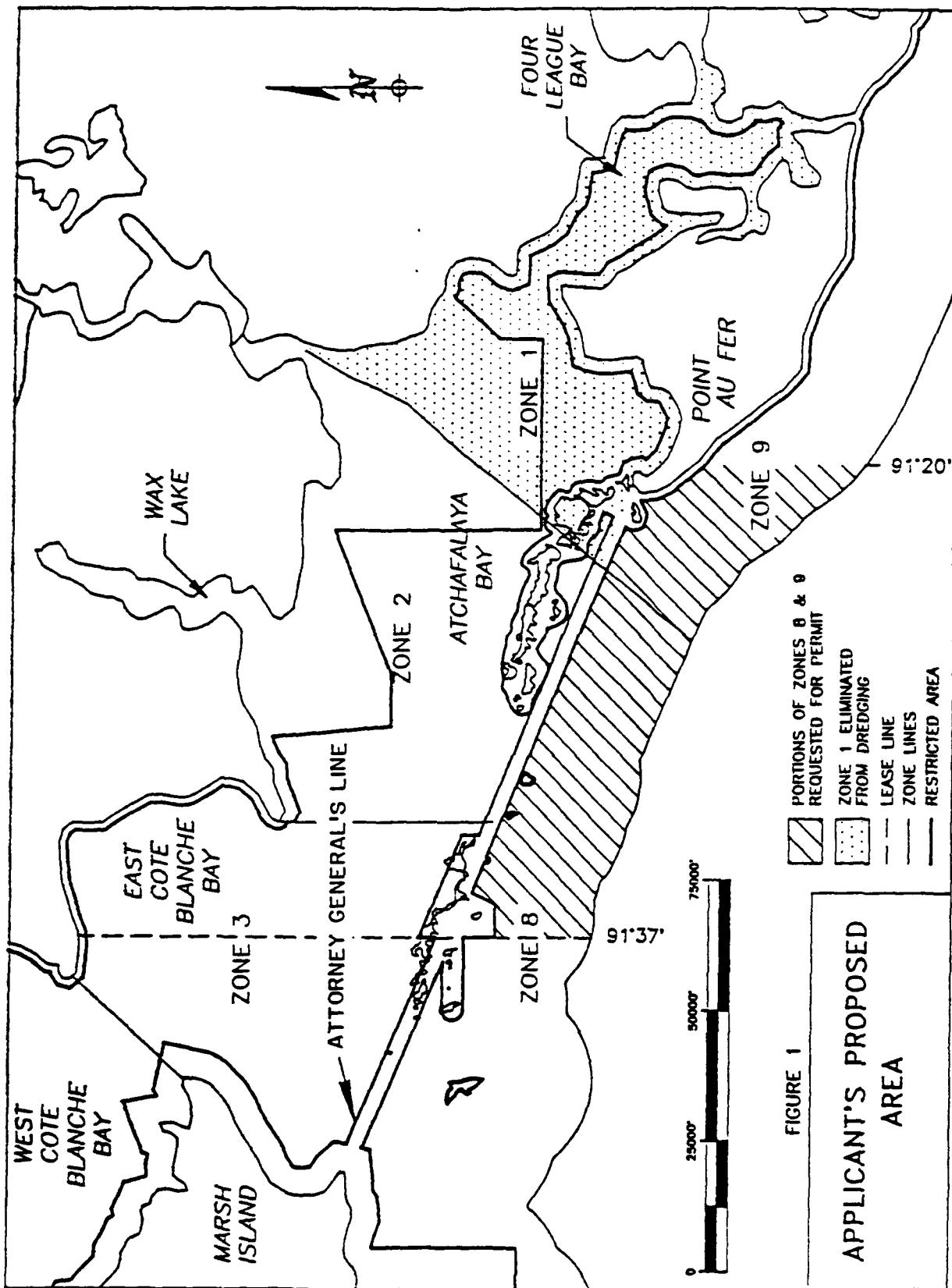
1. PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1. STATEMENT OF PURPOSE AND NEED

The purpose of the project is to maintain a viable industry by dredging for oyster shell buried by GOM sediments in those portions of Zones 8 & 9 which are currently included in the LDWF lease and permitted by the Coastal Management Division of the Louisiana Department of Natural Resources (LDNR) between Longitude 91°37' and 91°20' as shown in Figure 1. The original permit granted by the New Orleans District Corps of Engineers was for dredging oyster shell in Zones 1-3. As a result of litigation, oyster shell dredging is now limited to Zones 2 and 3, and the shell resource in this area is limited to a one or two year supply.

The shell resource dredged from the central Louisiana coast is used primarily as a source of construction aggregate for roadway base courses, levees, parking lots, roads, drilling barge pads, fill material, and oyster cultch, as well as a source of calcium carbonate for lime production, glass, chicken feed, pharmaceuticals, petroleum products, chemicals, water purification, and smokestack emission control materials. As a construction aggregate, shell's light weight, cementing and interlocking properties make it a very suitable material for embankments, roads, and shore protection, particularly in areas where the native soils are very soft and have poor structural properties, such as much of coastal Louisiana.

Through 1991 approximately 1.6 million cubic yards (MCY) of shell production was dredged annually from Atchafalaya and East Cote Blanche Bays (Zones 2-3). Shell dredging has never taken place in the nearshore GOM south of Atchafalaya Bay in those portions of Zones 8 & 9 as shown in Figure 1 for which a permit is sought.



The shell dredging industry currently operating in Atchafalaya, and East Cote Blanche Bays (Zones 2 & 3) employs 105 people directly (\$4.4 million in 1990), and hundreds of additional jobs in service, supply and transportation industries. The industry paid the State of Louisiana an average royalty of \$0.91 per cubic yard of oyster shells harvested in 1990 for a total of \$1.5 million. A severance tax of \$0.06 per ton of oyster shells harvested was also paid to the state for a total of \$75,819 in 1990, in addition to sales, property and income taxes paid by the industry and its employees to federal, state and local governments. The present lessee and permit applicant has contracted with the State of Louisiana to pay a royalty of \$2.67 per cubic yard for oyster shells harvested during the term of the current lease which expires October 31, 1994. The severance tax of \$0.06 remains the same as previously paid.

Because of the time frame in which the industry surveys shell resources to be dredged, it is difficult to exactly estimate the total reserves in the area currently being dredged (Zones 2-3). Superimposed upon this is the fact that future demand is unknown particularly since Rangia shell is no longer dredged from Lake Pontchartrain. Although the assumption has been made that demand in the future will be at the level of 1.6 to 1.7 MCY per year, an upturn in the local economy could increase demand.

The rapidly aggrading delta in Atchafalaya Bay has covered large deposits of shell and will continue to do so in coming years. Shell harvest during 1990 - 1991 from outside the building delta removed about 1.6 MCY per year from Zones 2 and 3. Given a static demand the resources in Zones 2 & 3 are estimated to provide no more than a one to two year supply. In the long term, the reserves in the portions of Zones 8 & 9 are needed for the industry's continued operation.

1.2.

HISTORY OF SHELL DREDGING IN COASTAL LOUISIANA

The first shell dredging lease in Louisiana was granted to Alfred Meade in 1914 for the removal of oyster reef shell exposed above the bay bottom located at Point-Au-Fer. This exclusive lease was for a relatively small acreage of water bottom. After Mr. Meade discovered shell deposits beneath the mud, he leased considerable acreage in the general vicinity.

By 1923, the shell industry had expanded and nearly all of the inshore coastal waters were leased for shell dredging including the western half of Louisiana, nearly all of Barataria Bay and a large area in Chandeleur Sound and Lake Borgne. These inshore areas were leased only until 1939. Thereafter, the lease was terminated because of complaints from oyster growers. Shell dredging operations at Point-Au-Fer were formally halted by the Department of Wildlife and Fisheries in 1973 although the company involved in dredging had previously ceased this activity at the request of the Attorney General and the Department of Wildlife and Fisheries. Additional information on these leases and the companies involved is given in Juneau (1984) and Glasgow (1968).

Shell dredging operations for buried oyster shells are conducted in the leased area limited to Atchafalaya and East Cote Blanche Bays. The 1990 and 1991 shell production in this area was approximately 1.6 MCY per year.

1.3.

SHELL DREDGING TECHNIQUES

1.3.1.

Introduction

The following is a description of shell dredging as it is now conducted in Zones 2-3. These same techniques would be used in the nearshore GOM portions of Zones 8 & 9. The techniques for locating the resources through extraction and transport out of the area are described.

The actual shell dredging (or extraction) in the coastal area consists of the removal of oyster shell buried beneath the mud line or bay bottom. Only shells that come from dead, mud-covered oysters would be extracted. In the GOM, buried oysters do not form a continuous, uninterrupted barrier reef system. Instead, disconnected oyster lenses occur. These lenses were created by live reefs which through natural processes became buried under several feet of mud. Oyster lenses are characteristically thicker in the center (up to 10 feet thick) and tapered on the edges. Oyster lenses are expensive and difficult to find because they are disconnected, small and every one is covered by mud.

Shell dredging is accomplished by a spudded down or anchored in-place barge which is only moved slightly as the deposits are dug into by the cutter head. Unlike channel dredging, the discharged dredged material, other than shell, is returned to the dredge cut. The basic shell dredging operations consist of exploration, extraction, processing, and transportation.

1.3.2. Exploration

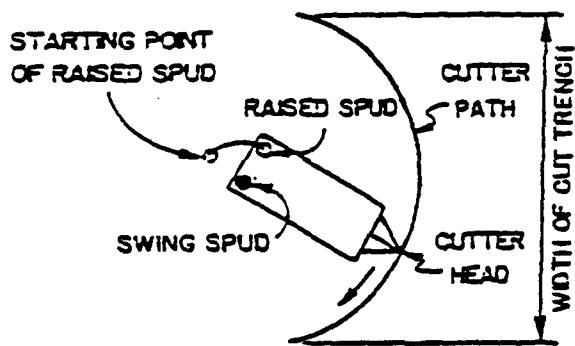
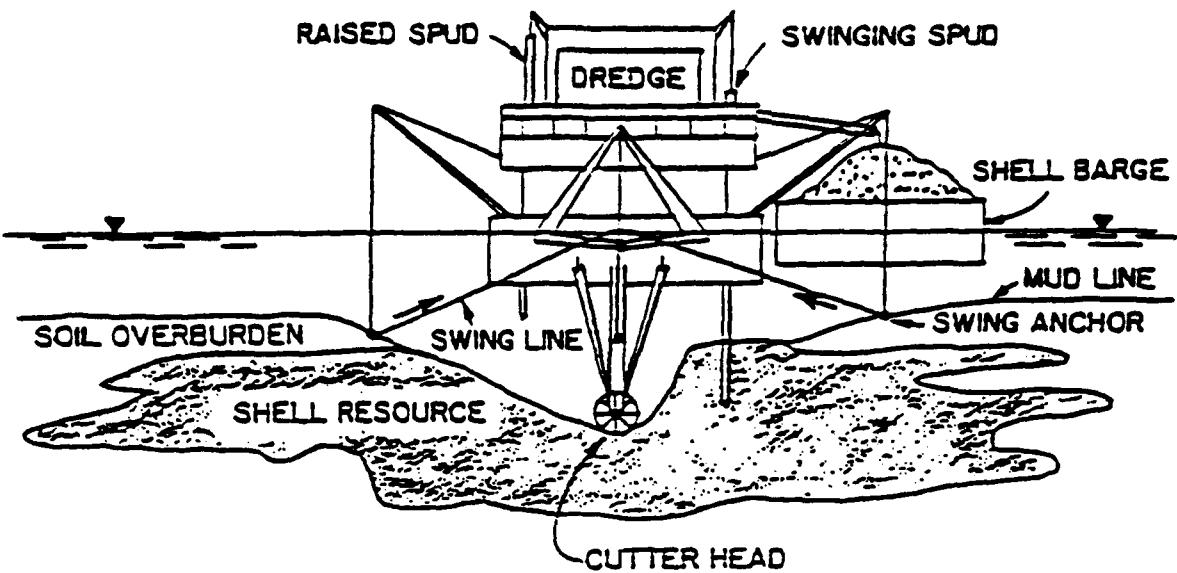
The exploration for extractable buried oyster shell resources is carried out during a relatively short period prior to extraction. The actual known and surveyed reserves precede extraction by less than a year. Shell surveys are currently carried out in two phases. The first phase is a broad survey on a 200 m grid. The second phase identifies shell deposits more closely within a closer grid (20 m on center) and detailed probing directly ahead of the dredge. In the past (until the mid-1970's) most surveying was done on a very informal basis with the only criterion being to keep just ahead of dredging. The exploration is carried out by two survey boats (the Penguin and the Widgeon) constructed especially for this purpose. Appendix B contains a drawing of the Penguin.

Currently one survey boat is used for first phase or exploration and the other boat is used for defining already discovered oyster shell deposits. In defining a deposit, numerous close order jettings are performed to determine extent of the area and depth of the reef.

1.3.3. Extraction Operations

The extraction of shell in the Louisiana coastal area is carried out in a dredging operation that is similar to channel dredging. In addition, the shells are processed on board the dredge, loaded onto barges and then transported. Two dredges belonging to or leased by Louisiana Dredging Company, the Mallard and the St. Charles, would work in the coastal area of Louisiana. Appendix B contains drawings and specifications for these vessels.

In extracting the resource, the dredges excavate oyster shell which is buried beneath the mudline or water bottom. Dredging is carried out in accordance with the diagrams shown in Figure 2. In operating the dredge, the vessel is positioned over the resource and the swing anchors set. One spud is set into the bottom. The cutter head is raised or lowered using the dredge ladder (which protrudes from the front of the dredge vessel). The dredge is swung in an arc on the spud so that a path may be cut through the buried reef. In order to rotate the dredge on the spud and subsequently move the cutter head through an arc, the swing anchor line is retrieved on the side in the direction of movement. The dredge can be swung to either side depending upon which swing line is retrieved. By raising and lowering the spuds alternately and swinging the cutter head through its working arc, the dredge is advanced forward. The limits of the dredging arc constitutes the width of the cut. The width of a typical trench is about 300 feet. However, dredges can swing through a wider arc. The depth of the cut is the depth of the resource, usually 17 to 22 feet.



AS DREDGE PROGRESSES, EACH SPUD IS ALTERNATELY RAISED AND LOWERED. SWING MOVEMENT IS CREATED BY ALTERNATELY WINCHING IN THE SWING LINES AND RESETTING THE SWING ANCHORS.

FIGURE 2

DIAGRAMMATIC SKETCH
OF DREDGING OPERATION

SCALE: NONE

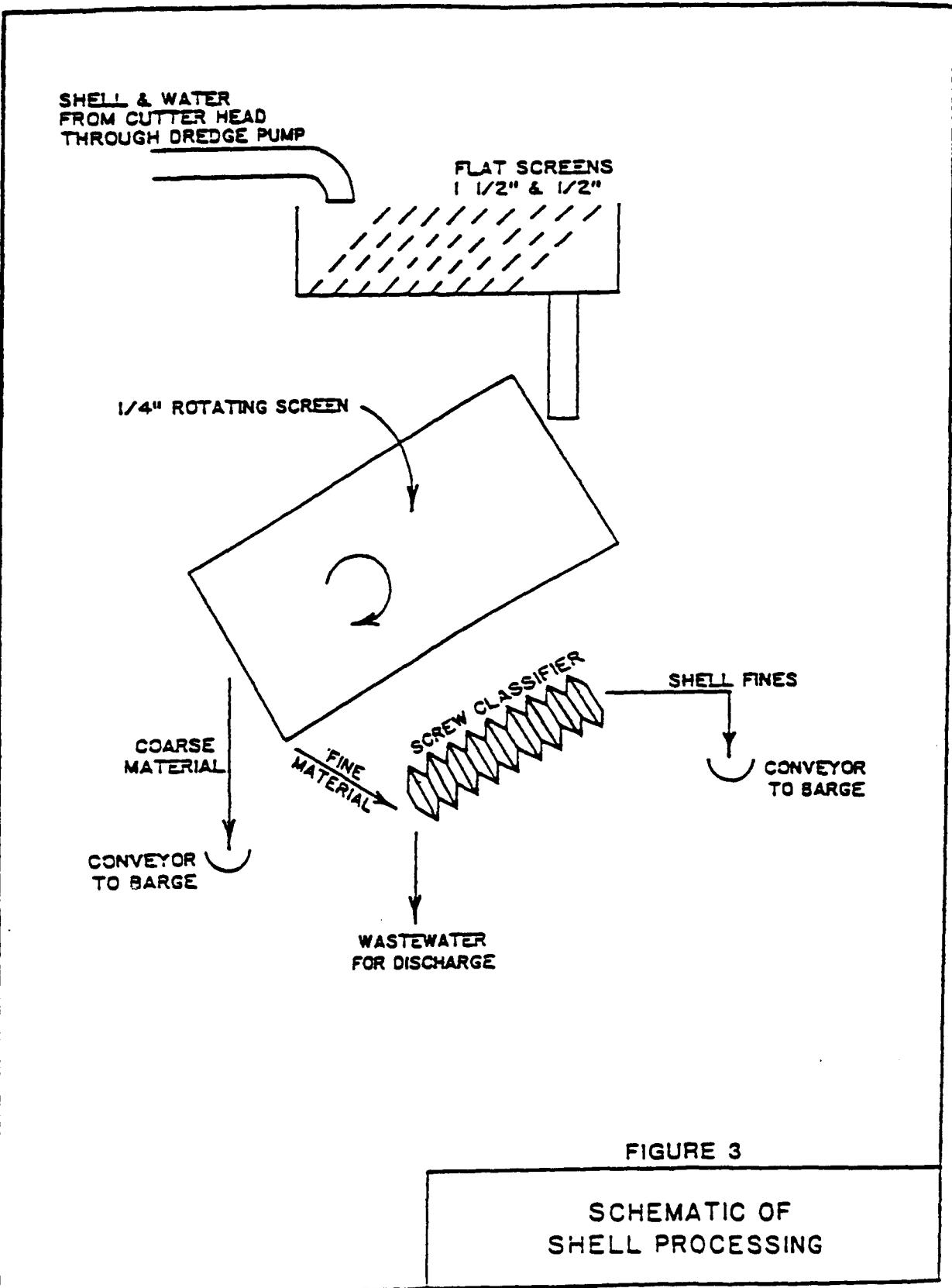
Prior to dredging, the outer limits of the extractable portion of shell deposits are marked with flags tied to poles which are stuck into the bottom. This flagging is used to define the reef area to be extracted. When a dredge is operated near a restricted zone, the edge of that zone is also flagged so that there is no chance of the dredge cutting into the restricted zone by mistake.

1.3.4. Processing

After the cutter head cuts the oyster shell reef, the shell, sediment and water mixture is pumped aboard the dredge and into a hopper equipped with flat screens (1 1/2 inch and 1/2 inch) that separate the coarse shell materials from the water and sediment. The escaping liquid sediment and finer shell mixture then flow by gravity into rotary (rotating) drum screens where still more material is removed (down to 1/4 inch). Following the drum screening, the material slurry is then washed on a screw washer where some of the shell fines (smaller than 1/4 inch) are captured. The shells in each portion of the process are moved by conveyor to the shell barge which is lashed along the side of the dredge. Wash water used in this process would be from the GOM. Water used to wash the shell materials in the processing is discharged at the stern of the dredge back into the dredge cut. Figure 3 shows a schematic diagram of the shell processing.

1.3.5. Transportation & Handling

All shell extracted is first transported by barge to customers or yards for interim storage. The nearest yard to the project area is at the intersection of Wax Lake Outlet and U.S. Highway 90. From the storage yard, the shell may be moved either by truck or barge to its ultimate destination.



2. ALTERNATIVES

2.1. INTRODUCTION

Shell dredging in Louisiana is regulated by multiple agencies including the U.S. Army Corps of Engineers (USACE), the Louisiana Department of Natural Resources (DNR) and the Louisiana Department of Wildlife and Fisheries (LDWF). Regulations and restrictions are often similar from agency to agency; and, where conflicts exist, the industry must follow the most stringent requirement.

Only alternatives involving dredging in the designated portions of Zones 8 and 9 in the GOM (Figure 1) were evaluated. The boundaries of this area were set solely by the Louisiana Department of Wildlife and Fisheries. Neither the applicant nor the Corps of Engineers, New Orleans District, has authority to set state lease boundaries.

2.2. DESCRIPTION OF ALTERNATIVES

2.2.1. No Action

With this alternative no shell dredging would be permitted in any GOM waters. Alternative materials would be obtained, primarily from out of state, to fill the construction and manufacturing needs once satisfied by shell. Twelve alternative materials were evaluated as potential substitutes for shell.

2.2.1.1. Alternative Materials

2.2.1.1.1. Shell

Shell possesses physical properties which make it an extremely useful construction material. The individual particles are very strong and have highly beneficial interlocking characteristics. Also, the calcium in the shells provides binding properties. Shell is light weight yet strong, and the interlocking and binding properties provide advantages over alternative materials in many applications. In coastal Louisiana, shell is readily available with sufficient reserves for continued use at the current rate for an extended period of time. Oyster shells are used locally for a roadway base, foundation support, water and sewer pipe bedding, erosion control, dams, pervious backfill, glass manufacture and chicken feed additive. Oyster shells can also be used for oyster cultch (material placed on the water bottom as a hard surface for oyster larvae to set and attach). The major uses of shell in Louisiana from data taken through 1985 were for general construction and maintenance including such uses as roadway base, parking lots, roads, drill pads and levees. Eighty percent of all shell mined was used for these purposes.

At the current cost, shell enjoys a price advantage over competing materials, and many small construction firms are partly dependent on shell, as financial limitations restrict the use of alternative materials. A comparison of alternative materials for each of the uses to which shell is put is given in Table 1.

TABLE I
COMPARISON OF ALTERNATIVE MATERIALS & USES

	Asphaltic Concrete	Clay Aggregate	Concrete	Geotextile	Gravel	Gypsum	Limestone	Recycled Concrete	Silica Sand	Spent Bauxite	Steel Slag	Scoria	Shell
Base Course	*	*	*	B	*	C	*	*	*	0	*	E	*
Bedding, Pipe & Others	X	X	X	*	*	C	*	*	*	E	*	*	*
Concrete Aggregate	X	X	X	X	*	X	*	X	*	X	*	*	*
Road Surfacing	*	A	*	X	*	E	*	*	A	D	*	E	*
Dolphin Fill	*	X	*	X	*	X	*	*	*	D	E	E	*
Filter Material	X	X	X	*	*	X	*	*	*	X	*	*	*
Pervious Backfill	X	X	X	X	*	X	*	*	*	X	*	*	*
Base for Offshore Struc.	X	X	X	X	*	X	*	*	*	X	*	X	*
Surcharge	X	*	X	X	*	*	*	*	*	*	*	X	*
Oyster Cutch	X	X	X	X	X	E	E	X	X	X	X	*	2
Erosion Control	*	*	*	*	*	X	*	*	*	X	*	X	*
Dams in Marsh & Wetlands	*	*	*	*	*	X	*	*	*	X	*	X	*
Dams in Uplands	*	*	*	*	*	X	*	*	*	*	*	X	*
Calcium Carbonate Source	X	X	X	X	X	X	*	X	X	X	X	X	*
Cement Manufacture	X	X	X	X	X	X	*	X	X	X	X	X	*
Lime Production	X	X	X	X	X	X	*	X	X	X	X	X	*
Chicken Feed Supplement	X	X	X	X	X	X	X	X	X	X	X	X	*
Misc. (Pharmc. glass mfgr)	X	X	X	X	X	X	*	X	*	X	X	X	*
Approximate Bulk Density (lbs/ft ³)	145	138	138	Light	105	70	122	109	99	135	115	Light	65

* - Feasible Substitute

A - Feasible When Used in a Sand-Clay-Gravel Mixture

B - Feasible by possibly Reducing the Amount of Shell Needed

C - Soluble - Stabilization and Dry Environment May be Required

D - More Information Needed - Would Have to be Stabilized

E - More Information Needed - May be Feasible Alternative

X - Unacceptable

1 - Lightweight Materials Often Needed Due to Bearing Capacity of Foundation

2 - Bangia shell preferable

2.2.1.1.2. Limestone

Limestone is generally composed of the calcitic remains of animals, silica, and other minerals. It is mined in Alabama, Missouri, Kentucky, and Texas, where it is crushed and graded before shipment to the delivery sites. Crushed limestone develops its strength from frictional forces, and its angular shape and durability make it a suitable construction material for roadways, work platforms, ballast, etc.

Limestone is a possible alternative material to shell if weight is not a consideration. Limestone's approximate bulk density is 100 pounds per cubic foot, which is more than shell's average bulk density of 65 pounds per cubic foot. Since limestone has to be transported from out of state, it has higher transportation costs than shell. Limestone, although expensive, has been a necessary alternative as the availability of shell declines and its price increases. It is currently used in road building as base course, embankments and aggregate surface course.

Limestone was used in over three miles of roadway construction in Hwy. 90. 438,670 cu yds. were used in this project and it was barged into the area from Missouri.

2.2.1.1.3. Gypsum Waste

Gypsum is a mineral consisting primarily of hydrated calcium sulfate. Gypsum waste is a by-product of the chemical industry and is plentiful in the parishes which border the Mississippi River. Although gypsum is readily available in southern Louisiana, it must be processed and its physical properties produce a poor alternative to shell. It also often contains low level radioactive residue. Gypsum is soluble in water, and a dry environment is required. In Louisiana, this is not feasible due to high water table, high humidity, and high rainfall.

2.2.1.1.4. Spent Bauxite

Spent bauxite is the by-product of aluminum manufacturing and is plentiful in southern Louisiana. Little information is available on its physical properties, and its uses as a construction material. Spent bauxite produced as a waste product in the manufacture of aluminum is highly caustic. Because of its colloidal and electro-chemical properties in the slurry, it does not compact very well and as such it can sit for years without dewatering.

2.2.1.1.5. Sand

Sand is composed of grains of quartz and other silica minerals. In Louisiana, most sand deposits are confined to the central and southeastern part of the state from the Sabine River on the west to the Pearl River on the east. The nearest sand deposits to the proposed shell dredging area are located in northern Vermilion and Iberia Parishes.

Sand is a possible alternative material to shell if weight is not a consideration. Sand's average bulk density is 99 pounds per cubic foot, which is 1.5 times that of shell's bulk density of 65 pounds per cubic foot. As a result, sand has a higher transportation cost. Sand could replace shell in only some uses as in base course, surcharge, pervious backfill, and as fine aggregate for concrete and bituminous mixtures. However, shell is a superior material to sand for use in pipe bedding, road surfaces and erosion control.

The previous lease holder, Dravo, obtained permits to dredge sand in the Atchafalaya River with the intention to convert shell dredging equipment and manpower to a sand dredging operation. Close consideration of the move, however, led them to the conclusion that such a move was not economically feasible. The price of sand was not high enough to sustain such an operation.

2.2.1.1.6. Others

Of the remaining alternative materials investigated, only gravel, recycled concrete, steel slag, and scoria possess physical and/or economical properties which might make them comparable to shell.

Gravel is composed of naturally occurring rock particles of quartz, chert and other minor minerals. In Louisiana, the majority of the deposits of gravel, which are overlain with sand, are located in the northern half of the state west of the Mississippi River, although gravel is found in the central portion of the state and in the Florida Parishes. Gravel's average bulk density is 105 pounds per cubic foot, which is slightly higher than sand and is 1.6 times that of shell's average bulk density. As with sand, gravel does not compete well in coastal Louisiana with shell due to high transportation cost.

Recycled concrete is composed of crushed concrete, which is durable and angular in shape. As a construction material, recycled concrete is comparable to shell when weight is not a concern. Recycled concrete's average bulk density is 109 pounds per cubic foot, which is 1.7 times the density of shell. Although crushed concrete is available in Louisiana, the supply for recycling is limited.

Steel slag is a by-product of the steel manufacturing industries. Its physical characteristics make it a good construction material. However, as an alternative material to shell, its average bulk density is 115 pounds per cubic foot which is 1.8 times that of shell. Economically, steel slag cannot compete with shell due to high transportation cost. The nearest significant source of steel slag is in Birmingham, Alabama, although some slag from recycling steel is available in LaPlace.

Scoria is volcanic rock formed by the solidification of molten lava and is composed primarily of silica and other minor minerals. It is highly porous and light weight, but lacks strength unless crushed to sand size. On a limited basis, scoria could replace shell as bedding material, some concrete aggregate, filter material and pervious backfill. Little information is available on its physical properties and its uses as a construction material. Since scoria has to be transported from very long distances from out of state, it cannot economically compete with shell.

2.2.2. Alternative Permit Restrictions

This alternative assumes that permits will be issued within the designated portion of Zones 8 and 9 as shown in Figure 1. The removal of shell resources within the currently existing area, Zones 2 & 3, is allowed in 78,680 acres with the restrictions which are designed to protect certain sensitive resources (i.e., the developing delta, exposed oyster reefs, etc.). Additional restrictions to dredging in Zones 8 and 9 could be included as conditions to any Federal permit pending the results of the Section 404(b)(1) evaluation and the public interest review.

The area currently under lease to Louisiana Dredging Company consists of 129,952 acres of which 51,272 is open to dredging and is within the offshore portion of the tract as Zones 8 & 9.

2.2.3. Issue Permits with Additional Restrictions

For purposes of discussion, the alternative of imposing additional restrictions on the shell dredging industry is divided as follows: additional restrictions on dredging intensity and additional restrictions on dredging discharges.

2.2.3.1. Additional Restrictions on Dredging Intensity

Permit conditions in the coastal area allow the permittee a maximum of two dredges operating at any one time. Because the areas in which shell dredging is currently permitted as well as those portions of Zones 8 & 9 for which permit issuance is sought are under exclusive lease by the State of Louisiana to Louisiana Dredging Company, a maximum of two dredges will be operated for shell extraction in the area. This alternative will therefore not be considered further in this EIS.

2.2.3.2. Additional Restrictions on Dredging Discharge

Permit conditions currently require the dredge discharge be directed over the dredge cut and that the cut be leveled as much as possible so as not to create hazards to navigation.

A study of the discharge pressure of a typical shell dredge operated by Dravo Materials and conducted by Steimle and Associates (1985) concluded that the discharge of the dredge was not under pumped pressure but fell by gravity primarily into the cut behind the dredge. The study concluded that although it is possible to further reduce discharge pressure, the further reduction was not warranted because it would have little effect on water column turbidity. The study did find merit in some submergence of the discharge to eliminate surface turbidity emanating from an above surface discharge. However, it is possible that such submergence would cause bottom scours.

Further, the study found that silt screen usage was infeasible with a moving dredge. Coastal dredges do not move as much as lake dredges, but they nonetheless move and would require that the screens constantly be repositioned. Additionally, screens are only effective in low current velocity environments. Current velocities in the coastal areas are occasionally very strong and screens would not be effective under those conditions.

Because this alternative has been thoroughly researched and found infeasible, no further consideration will be given in this EIS.

2.2.4. Issue Permit with Reduced Restrictions

As in the preceding section, the reduction of restrictions will be considered in three groups as follows: areas available for dredging, dredging intensity, and dredge discharge.

2.2.4.1. Reduced Restrictions on Areas Available for Dredging

Areal restrictions on dredging have been derived by regulatory agencies in consultation with the industry. Restricted areas have been imposed to protect sensitive shoreline and reef areas, and it is unrealistic to consider reducing these restricted areas. This alternative will, therefore, not be examined in this EIS.

2.2.4.2. Reduced Restrictions on Dredging Intensity

An increase in dredging intensity would entail lifting the two dredge maximum. Because Louisiana Dredging Company has not applied for a permit to increase the number of dredges beyond two, this alternative will not be considered in detail.

2.2.4.3. Reduced Restrictions on Dredge Discharge

Dredge discharge must currently be directed back into the cut and must be leveled so as not to be a hazard to navigation. These requirements are minimal for purposes of operation in navigable bays and any reduction of these restrictions would be impractical.

2.3. ALTERNATIVES CONSIDERED IN DETAIL

The following alternatives are those which will be considered in detail in this EIS.

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

ALTERNATIVE 2 No Action - No dredging in Portions of Zones 8 and 9

2.4. COMPARATIVE IMPACTS OF ALTERNATIVES

Table 2 lists the impacts of the two alternatives considered in detail on the significant resources/issues potentially impacted by the proposed project.

TABLE 2
COMPARATIVE IMPACTS OF ALTERNATIVES

(Page 1 of 5)

Resource/Issue	Existing Conditions	Applicant's Proposal	
		Alternative 1	No Action Alternative 2
Mineral resources	Numerous producing oil and gas wells.	No impact.	No Impact
Physical processes	Subsidence rates of 2.3 ft/100 yrs shoreline/erosion rates of 7.5 to 9.2 ft/yr.	No impact subsidence. Holes left by dredging would have negligible impact on wave heights, coastal erosion, and land loss.	No impact on subsidence, erosion or land loss.
Holes/troughs	No dredging has occurred in the project area.	In areas of high sedimentation holes would fill rapidly. Fill rate would be much slower in areas where scour is occurring.	No new holes would be produced.
Refuges/wildlife management areas (WMAs)	Atchafalaya Delta WMA, located adjacent to project area.	No impact.	No Impact.
Water column water/sediment quality-contaminants/sediment-physical characteristics (WMAs)	Designated for primary and secondary contact recreation, fish and shellfish propagation. Sediments generally silty clay to clayey silt with the fine sand fraction increases offshore. Natural turbidity levels high in winter and spring.	Little impact on water quality. Temporary increase in turbidity and suspended solids within a few hundred feet of dredge. Long term turbidity impacts inconsequential. No biomagnification impacts. Fluid mud impacts minimal and local. Release of any contaminants from sediment minima. Sediment directed back into hole.	No dredging-related turbidity. 500-600 acres of water bottoms would remain undisturbed each year.

TABLE 2
COMPARATIVE IMPACTS OF ALTERNATIVES

(Page 2 of 5)

Resource/Issue	Existing Conditions	Applicant's Proposal Alternative 1	Permit Denial Alternative 2
Phytoplankton	Phytoplankton productivity varies seasonally with river discharge.	Impacts minimal, highly localised and confined to an area of approximately 200 feet around each dredge where dissolved oxygen layered and light penetration decreased. Thus, phytoplankton productivity lowered. Resuspension of nutrients may increase productivity.	Impacts to phytoplankton described in Alt. 1 would not occur.
Fisheries	Productive - typical of north central Gulf of Mexico estuary with strong saltwater influence elsewhere.	Impacts to fisheries transient and minimal. Temporary turbidity causes numerous minor impacts - clogs gills, affects behavior, or interferes with feeding. Holes left after dredging provide refuge for fish during cold weather.	Minor impacts to fisheries described in Alt. 1 would not occur.
Benthos	Area off AB seasonally influenced by Atchafalaya River discharge. Dominated by a few widespread species.	If 2 permitted dredges operated, benthos on 2 acres of water bottoms would be destroyed each day. As holes fill, repopulation starts within 3 months and generally complete within 3 years. Fluid mud layer thin and only impacts small organisms or poor burrowers in vicinity of dredge.	Impacts to benthos described in Alt. 1 would not occur.

(Page 3 of 5)

TABLE 2
COMPARATIVE IMPACTS OF ALTERNATIVES

Resource/Issue	Existing Conditions	Applicant's Proposal Alternative 1	Permit Denial Alternative 2
Oyster reefs	<p>During some years temporary reefs occur. High salinities will destroy reefs especially during summer. Exposed reefs are highly productive centers of biological activity.</p> <p>Endangered Kemp's ridley sea turtle and threatened loggerhead sea turtle sighted in project area.</p> <p>Business and industrial activity</p>	<p>No impact.</p> <p>No impact.</p> <p>No impact.</p>	<p>No impact.</p> <p>No impact.</p> <p>Shell resource from project area would be unavailable as a construction material. As delta expands, shell dredging from AB and ECBB is further restricted and shell would be unavailable as construction material. Loss of \$8,000,000 in capital investments. No fisheries impacts.</p> <p>Oyster shells would continue to provide material for construction for 5 to 8 years longer. Fisheries impacts minimal.</p> <p>No shell has been produced from the project area. Most shell used for general construction and maintenance. Production in AB and ECBB is declining, recently averaged just over 1.6 million cu. yds. per year. With multiplier effect, production of this important raw material provides further stimulus to the local economy. Mineral production and fishing also important in project area. Fisheries resource is a multimillion dollar industry in surrounding area, both finfish and shrimp.</p>
Commercial fishing			
Commercial mineral production			
Recreational activities			
Public safety			
Water quality			
Wetlands			
Soil			
Groundwater			
Surface water			
Wildlife			
Archeological resources			
Natural resources			
Scenic resources			
Historic resources			
Public lands			
Private lands			
Water supply			
Energy			
Transportation			
Land use			
Population			
Health			
Economic			
Other			

TABLE 2
COMPARATIVE IMPACTS OF ALTERNATIVES

(Page 4 of 5)

Resource/Issue	Existing Conditions	Applicant's Proposal Alternative 1	Permit Denial Alternative 2
Employment/labor force and displacement of people	105 jobs due to shell dredging. 315 additional jobs depend on dredging.	Additional known and suspected shell reserves increase life of the industry by 3 to 4 years. Shell dredging jobs sustained until depletion of the resource.	As shell reserves in AB and ECBB are depleted or restricted, approximately 105 jobs lost directly. 315 jobs dependent on dredging also lost.
Property values	Values falling. Dredgers have \$8 million in equipment.	Value of dredging equipment maintained until recoverable shell gone.	\$7 million lost. Unemployment cause loss in value of residential housing. Loss would come after AB and ECBB are depleted or restricted.
Public facilities and services/tax revenues	Present shell production is from AB and ECBB. It has often been used in flood control projects and its production has generated revenues for the State Department of Wildlife and Fisheries. Income generated has created tax revenues for the local economy.	Public services continue to be enhanced by royalties and taxes and shells available for roads until resource depleted.	After other areas are depleted or restricted, more costly, less desirable road base must be used. Loss of royalty and tax money would add to governmental budgetary deficit. Increased outlays for unemployment.
Transportation	Shell is best aggregate for use in highway and airport construction, especially in wetlands. The lightweight of shell has been determined to be particularly valuable.	Additional known and suspected shell deposits would continue to be available for highway work until resources depleted.	After other areas are depleted or restricted, other aggregates would have to be used.
Esthetic values/noise	Natural turbidity high in project area, especially during high river flows. Noise in bays from oil field operations and fishing.	Esthetic and noise impacts are increased turbidity/noise in the immediate vicinity of the dredge.	No impact.

TABLE 2
COMPARATIVE IMPACTS OF ALTERNATIVES

(Page 5 of 5)

Resource/Issue	Existing Conditions	Applicant's Proposal	
		Alternative 1	Permit Denial Alternative 2
Archaeology/cultural resources	Underwater cultural resources protected by existing regulations.	Cultural resources will be further protected by permit conditions.	No impact.
Desirable regional growth/desirable community growth/community cohesion	Growth slow in recent years; linked to factors such as stable employment and high income. Cohesion affected by concern about impacts on delta building and shoreline erosion.	Continued employment, royalties and taxes generated by industry until depletion would contribute to positive community and regional growth and community cohesion. Continued concern would result over the effects of environmental impacts within the community.	Adverse impact; more costly, less desirable material would further discourage regional and community growth. Loss of employment also adversely affect growth and the potential also exists for future community fragmentation.
Recreation	Opportunities for variety of outdoor oriented recreation-fishing and shrimping very popular.	Little or no impact. Some fishermen would leave the vicinity of the dredge, others would congregate there in the belief that fish are attracted to the disturbance.	Little impact. Fishermen and shrimpers could fish anywhere without conflict with dredges; any benefits of fish attracted to dredging would be lost.

3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES

3.1. INTRODUCTION

The shell dredging industry has never extracted shell from the proposed GOM project area. Based on 1990 - 1991 rates of production (approximately 1.6 to 1.7 MCY/year) and existing restrictions, the surveyed reserves in the active project area within the Atchafalaya and East Cote Blanche bays can provide for one to two years of dredging activity. Based on preliminary survey data, Zones 8 and 9 could account for 17 to 26 MCY of oyster shells. Shell dredging industry representatives have stated that unproven reserves in the nearshore GOM comprising the proposed area may be much larger than the estimated reserves.

The current permit application is based upon the applicant's best estimate of the existing reserves. It is impossible to base the permit action upon anything except the best existing data. Additional permit actions would be required to dredge reserves discovered in areas extending beyond current project boundaries.

3.2. LOCATION AND ENVIRONMENTAL SETTING OF THE PROPOSED ACTIVITY

3.2.1. Project Area Description

The project area consists of 56,556 total acres between longitude 91°37' and longitude 91°20' and seaward three miles from the Attorney General's line and is all open water. Of this acreage, approximately 51,272 acres would be open to shell dredging under the current restrictions. The restricted area consists of a zone 1500 feet wide south of and along the Attorney General's Line, the northern border of the project area.

The project area is bordered by brackish to saline marshes in the area of Point Au Fer and eastward, Atchafalaya, and East Cote Blanche Bays to the north and west, and the GOM (Federal waters - beyond the 3 mile limit) to the south and west. The project area is all open water. Numerous exposed (subaerial), subaqueous, and buried shell reefs are known to exist in the project area south of Atchafalaya Bay. Out to the three mile offshore limit of the project area, depths are a maximum of 30 feet.

Salinity in this zone is dependent to a large extent on the discharge from the Wax Lake Outlet and lower Atchafalaya River and to a lesser extent the Mississippi River. Depending on river discharge, tidal stage and predominant wind direction, salinity at Eugene Island, just north of the project area, can range from fresh water to sea water (35-36 parts per thousand salinity). Under favorable environmental conditions, oyster leases in the GOM near the living shell reefs south of Marsh Island and Atchafalaya Bay outside of the project area can produce seed and/or market sized oysters.

Wetlands in closest proximity to the proposed project area are the brackish marshes that occur northeast of the project area near Point Au Fer Island on the Terrebonne coast. Common brackish marsh plants are three-cornered grass (Scirpus olneyi), marsh hay cordgrass (Spartina patens), smooth cordgrass (Spartina alterniflora), saltgrass (Distichlis spicata), and black rush (Juncus romerianus) (Chabrek, 1972). Soils of the brackish marsh are fine-grained but have a lower organic content than fresh marsh deposits. A typical soils sequence consists of a root mat underlain by peats with small zones of silty clay. With depth, the soils grade into organic blue-gray clay (Smith et al., 1986). Wetland areas also comprise the northern boundaries of Atchafalaya and the Cote Blanche bays many miles northerly from the GOM.

The area is transected by the Atchafalaya River channel into the GOM.

3.3.

GEOLOGICAL SETTING

3.3.1.

Geologic History

Geologically, the project area is located in the western portion of the Mississippi River deltaic plain. During the last interglacial period, when sea level was approximately as it is now, Pleistocene sediments of alluvial and deltaic nature were laid down. As sea level dropped with the advent of the last glacial period, the streams and rivers (including the Mississippi) discharged through eroded canyons and valleys. As the glacial period ended and sea level rose back to its initial levels before glaciation, the canyons and valleys began to fill with recent sediments. During the glacial period, the surface of the Pleistocene sediments was weathered, oxidized and hardened. During the post-glacial period, the previously fragmented prairie terrace has been covered by deltaic and coastal sediments. The recent geologic history of the project area is characterized by deltaic processes of the Mississippi River and its tributaries. Over the past 8,000 years, several major deltaic complexes have developed along the Louisiana coastline. From oldest to youngest, the deltaic complexes of south Louisiana are the Maringouin, Teche (or Sale-Cypremort), St. Bernard, Lafourche, and Plaquemines (Van Lopick, 1955; Coleman, 1966).

The earliest deltaic complex, the Maringouin, was actively depositing sediment into the area of Iberia and St. Mary Parishes approximately 6,000 to 8,000 years ago (Smith *et al.*, 1986). Approximately 5,800 years ago, the Mississippi River shifted its course and the Teche deltaic complex was deposited. Approximately 3,900 years ago, the Teche system was abandoned and the river shifted eastward to the area of New Orleans where the St. Bernard Delta was formed.

Approximately 2,000 years ago, the river again shifted westward and a new delta, the Lafourche, developed along the central Louisiana coastline. Progradation of the central to western coastline occurred until about 500 years ago when the Lafourche course was abandoned for the present course of the river. Since then, the river has been confined to its present course and a small birds-foot delta, the Plaquemines-Recent, has developed. Coastal erosion, delta flank erosion, and subsidence have been the dominant factors controlling the Louisiana coastline.

Records of the USACE indicate that around 1850, the Atchafalaya River conveyed less than 10% of the Mississippi Basin flows on an annual basis. This amount increased to about 13% in 1900 and 17% in 1910. The Old River Control Structures regulate the distribution of flow so that the Atchafalaya today conveys, on a daily basis, 30% of the combined flow of the Mississippi and Red Rivers. With a new outlet for sediment deposition, the Mississippi has initiated the development of the Atchafalaya deltaic complex.

3.3.2. Physiographic Features

In Louisiana, four Pleistocene terrace levels have been mapped. During the Pleistocene epoch, glacial development associated with climatic changes produced fluctuations in sea level that may have reached several hundred feet. During periods of lowered sea level, waters from glacial ice melts transported vast quantities of sediment gulfward through the Mississippi Valley. Deposition along the GOM produced massive accumulations of terrace deposits. They are, in chronological order from oldest to youngest, the Williana, Bentley, Montgomery, and Prairie terraces. Within the project vicinity, only the Prairie terrace is present. The lithology of the Prairie formation is similar to that of the older Pleistocene deposits. It contains an upper stratum of clay-silt with zones of shell, of which Ostrea

(probably Crassostrea) and Rangia are abundantly represented. Beneath the silt-clay and shell layer, there is generally a fine-grained blue-gray sand that grades downward into hard blue-green shale or into medium-grained brown or yellow sand. This further grades downward into coarse sand and then into sand and gravel (Jones et al., 1954).

Regionally, the project area is affected by processes associated with the structure and stratigraphy of the GOM. Since the formation of the GOM in the early Mesozoic, the northern rim of the Gulf Basin has received a rather continuous influx of river-transported sediment. Gradual subsidence, accompanied by sedimentation, has produced a downwarping of continental material and the formation of a linear sedimentary trough known as the Gulf Coast geosyncline. The axis of this structure extends from the northeastern portion of Mexico to the Alabama coast. A near continuous influx of sediment into the geosyncline has produced a massive accumulation of sedimentary section that thickens gulfward and may attain a thickness of 60,000 feet in the vicinity of the present Louisiana coastline.

3.3.3. Subsidence and Land Loss

3.3.3.1. Existing Conditions

Land loss is the result of both natural processes associated with deltaic transgressional and man-induced factors. The major impacts of land loss are increased saltwater intrusion, the loss of storm buffering capacity and increased nutrient levels or eutrophication. The economic consequences include the destruction of property and the loss of valuable coastal wetland as nursery grounds for finfish and shellfish production.

Natural causes of land loss include sea level rise, subsidence/compaction, wave and wind action, storm surges and biological degradation (Coleman *et al.*, 1985). Man-induced factors have contributed to wetland degradation through flood control, land reclamation projects, impoundment, fluid withdrawal, levees, canal dredging and the deposition of spoil material (Coleman *et al.*, 1985).

In the surrounding area, land loss varies from severe at Isles Dernieres to land gain west of Marsh Island in the Chenier Plain. It is estimated that from 1887 to 1979, Isles Dernieres have diminished in area 71 percent due to wave action and rapid subsidence (Penland and Boyd, 1982). In the Chenier Plain, suspended sediment from the Atchafalaya River is accumulating as mudflats from Freshwater Bayou Canal to Rollover Bayou. Under existing conditions, accelerated growth of the Chenier Plain is expected in the next 50 to 100 years when the Atchafalaya Delta outgrows the Atchafalaya Bay, allowing greater volumes of sediment to enter this shelf region (Wells and Kemp, 1981).

Rises and falls in sea level elevations can be contributed to daily tides, seasonal factors such as river discharge and weather patterns, long term global tectonic changes in ocean basin volumes, global temperature trends resulting in the melting or expansion of ice caps and glaciers, as well as local subsidence of the ground surface (Boesch *et al.*, 1983). Long term global (eustatic) sea level has been rising at a rate of approximately 1.2 mm/yr., but may be increasing to 1 cm/yr. due to global warming trends (Nummendal, 1982).

In Louisiana, subsidence occurs naturally as a result of downwarping of the earth's crust due to thermal cooling and excessive sediment loading and rapid compaction of unconsolidated coastal sediment. The rate of loss of wetlands due to subsidence varies in relation to the supply of sediments available for continued accretion and the composition and age of the sediments undergoing compaction.

The rate of compaction is greater in newer delta lobes and near the coast. The rate of subsidence decreases moving away from the delta deposition center; therefore, subsidence is expected to be about equal through the project area in the emerging Atchafalaya Delta. Local variation in subsidence is not well documented.

In south-central Louisiana, the subsidence rate is estimated at 8.5 mm/yr. (Boesch *et al.*, 1983). In a study by Baumann *et al.* (1984), the subsidence rate over a thirty year period in the Four League Bay marsh was 7 mm/yr. At Eugene Island, the entrance to the Atchafalaya Bay, the subsidence rate was 7 mm/yr., although this figure is open to question due to gauge leveling problems (Boesch *et al.*, 1983).

Over the past 8,000 years, vast quantities of sediment have been periodically introduced into the project area by ancestral Mississippi River courses which produced the Maringouin and Teche. At present, sediment is being introduced into the project area as a result of the partial diversion of the Mississippi through the Atchafalaya River. The average sediment load carried by the Atchafalaya at Simmesport for the period 1973 - 1982 is 283,000 tons per day. In the Atchafalaya Basin, sediment is deposited in the lakes and bays along the river. Finer material is being deposited along the coastline and into the GOM through Wax Lake Outlet and the lower Atchafalaya River. Once again, progradation of the central coastal area is taking place. If the flow through the Atchafalaya system was not controlled by the U.S. Army Corps of Engineers, the Atchafalaya would eventually become the major course of the Mississippi River and the site of maximum sedimentation and deltaic development would again shift to the western coastal area.

Bottom sediments of the coastal nearshore marine environment are also subjected to reworking by currents and wave action. Low energy conditions that exist over most of the year allow for the deposition of silty clays and minor amounts of sand. During higher energy conditions, winnowing of the fine fraction occurs, leaving cleaner, well-sorted silt and sand layers. These sands and silts occur as lenses within clay or as distinct layers (Coleman, 1966).

The increased discharge of sediment through the Atchafalaya River has re-established the process of coastal progradation in the area, as seen by the presence of mudflats which cover some of the present shoreline. As stated previously, coarser Atchafalaya River bedload material is being deposited into the many lakes and bays along the river, while sediments of the finer fractions are being deposited along the coast and into the GOM through the lower Atchafalaya River and Wax Lake Outlet. The prevailing westerly longshore currents transport the fine suspended muds, occasionally referred to as fluid muds, along the coast.

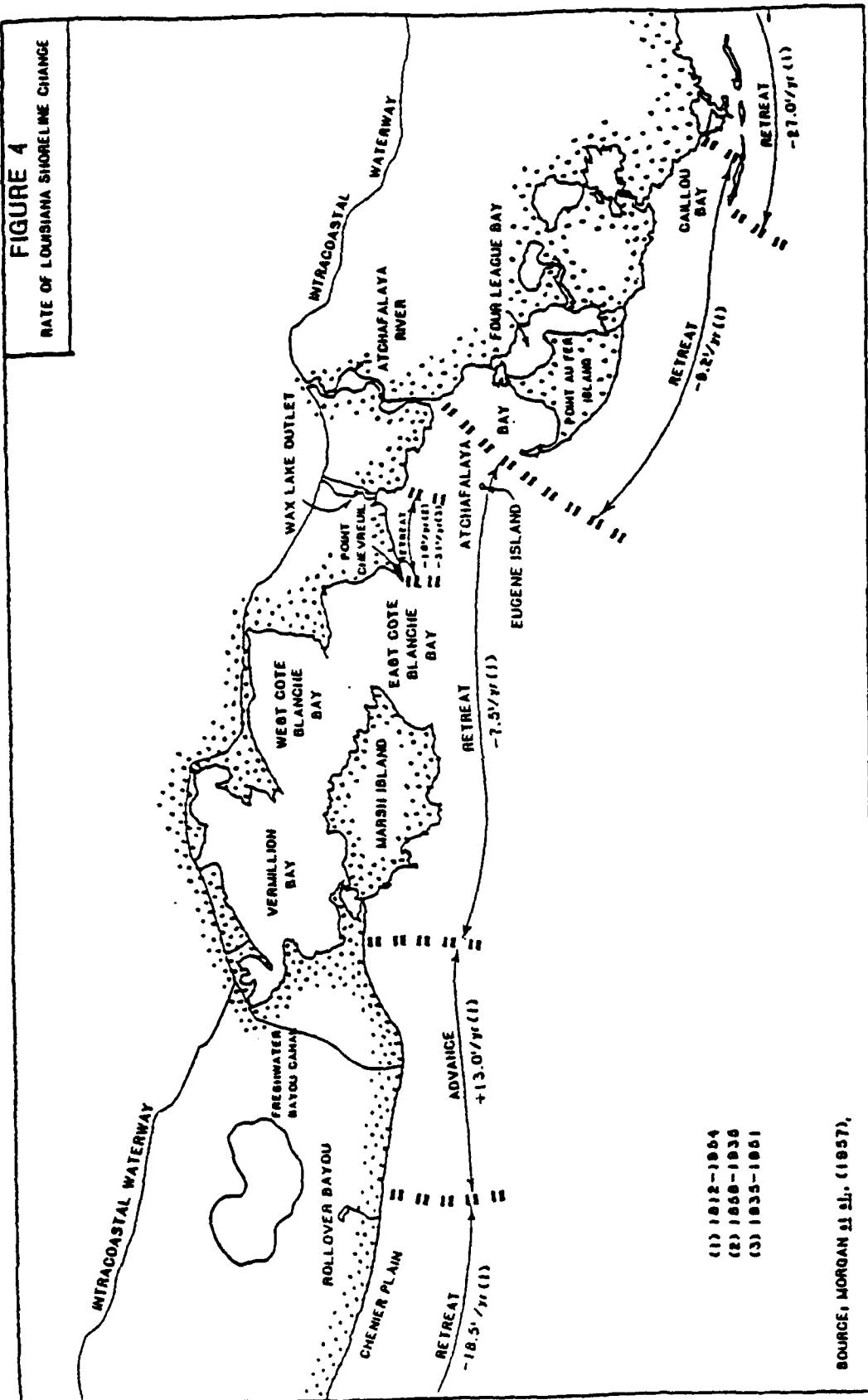
Bottom sediment samples, taken by Steimle and Associates, Inc., in the project area and surrounding areas were collected on 26-28 January 1987. The sediment samples were collected in 2 inch by 20 inch plastic core tubes plunged at least six inches into the bottom sediment. The upper 6 inches of the sediment core sample were analyzed in the laboratory and given a physical classification. The samples were further classified according to the Unified Soil Classification System based on the results of water content percent, organic percent and sediment grain size analyses performed. The sample locations and results of the laboratory analyses are given in Appendix C. Bottom sediments of the project area consist primarily of slightly organic clays with variable amounts of shell fragments and sand and silt lenses. Organic contents of the samples classified as clays ranged from a minimum of 3.8% to a maximum of 6.0%. The clay content of the samples varied from a minimum of 24% to a maximum of 85%. Only 12 out of 42 sample locations failed to show shell fragments upon examination.

The coastline of the study area is in the deltaic area. The marginal deltaic area is characterized by the smooth regular shoreline to the west of Marsh Island. This area receives fine grained sediments from the Atchafalaya River to the east which are deposited as mudflats and reworked by tidal and wave action (Morgan *et al.*, 1953). East of Marsh Island, the true deltaic area has an extremely irregular coastline.

Figure 4 presents the change in shoreline in the surrounding area. In a small region west of Marsh Island, the coastline advance of 13 feet per year is due in part to the mudflat deposition from the increased discharge of the Atchafalaya River, and in part to the interruption by the nearshore shoal areas of the westward longshore drift (Morgan *et al.* 1953). The remaining coastal area is retreating at varying rates.

The coastal area of Point Au Fer Island eastward to the coast of Caillou Bay exhibits a retreat rate of 9.2 feet per year. The coastal area near Marsh Island is retreating at a rate of 7.5 feet per year (Morgan and Larimore, 1957). This area receives some sediment from the Atchafalaya River although the rate of growth is insufficient to stop the coastal retreat. If the Atchafalaya River discharge should continue to increase as expected, the additional sediment supplied to this area should reverse this retreat in the next 50 to 100 years (Wells and Kemp, 1982). This would also be true for much of the Chenier Plain and southern Marsh Island.

FIGURE 4
RATE OF LOUISIANA SHORELINE CHANGE



In a study of land loss by Britsch and Kemp (1990), photographic data from the early 30's to 1990 were examined and land loss rates determined for the areas of 62 quadrangles in coastal Louisiana. For the Point Au Fer Quadrangle area (which contains part of the project area) and the Oyster Bayou Quadrangle (which is just to the east of the project area), the following land loss data were presented.

<u>Quadrangle Name</u>	<u>Point Au Fer</u>	<u>Oyster Bayou</u>
Period	1931 - 1956	1931 - 1956
Land Loss miles ² /yr.	0.11	0.07
Period	1956 - 1974	1956 - 1974
Land Loss miles ² /yr.	0.16	0.18
Period	1974 - 1983	1974 - 1983
Land Loss miles ² /yr.	0.17	0.15
Period	1983 - 1990	1983 - 1990
Land Loss miles ² /yr.	0.11	0.07

From these data it appears that the rate of land loss may be slowing on some of the shorelines adjacent to the project area.

3.3.3.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Former living oyster reef structures now buried beneath the mud bottoms of the waters in the project area have not been proven to provide barriers to coastal erosion forces inshore of the project area. Only those reefs which are above the mud line can provide protection for inland shoreline areas. The removal of buried reefs are not

anticipated to result in any significant impact on land loss. The use of the harvested shell in activities which could accelerate degradation of the wetlands appears to have no greater impact than the use of any other substitute material.

Subsidence is affected by those outside factors discussed, i.e., sedimentation, erosion, and sea level changes and therefore will not be significantly affected by the dredging of shells in the area.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

This alternative will have no effect on land loss or subsidence.

3.3.4. Holes and Troughs

3.3.4.1. Existing Conditions

The process by which buried reef shell is extracted results in the formation of irregularly shaped holes and/or troughs. The depth of the trough is variable and depends on the thickness of overburden sediment, the thickness of the reef shell and the depth of the reef shell. The pivoting swing-line action of the dredge produces troughs whose width averages approximately 300 feet.

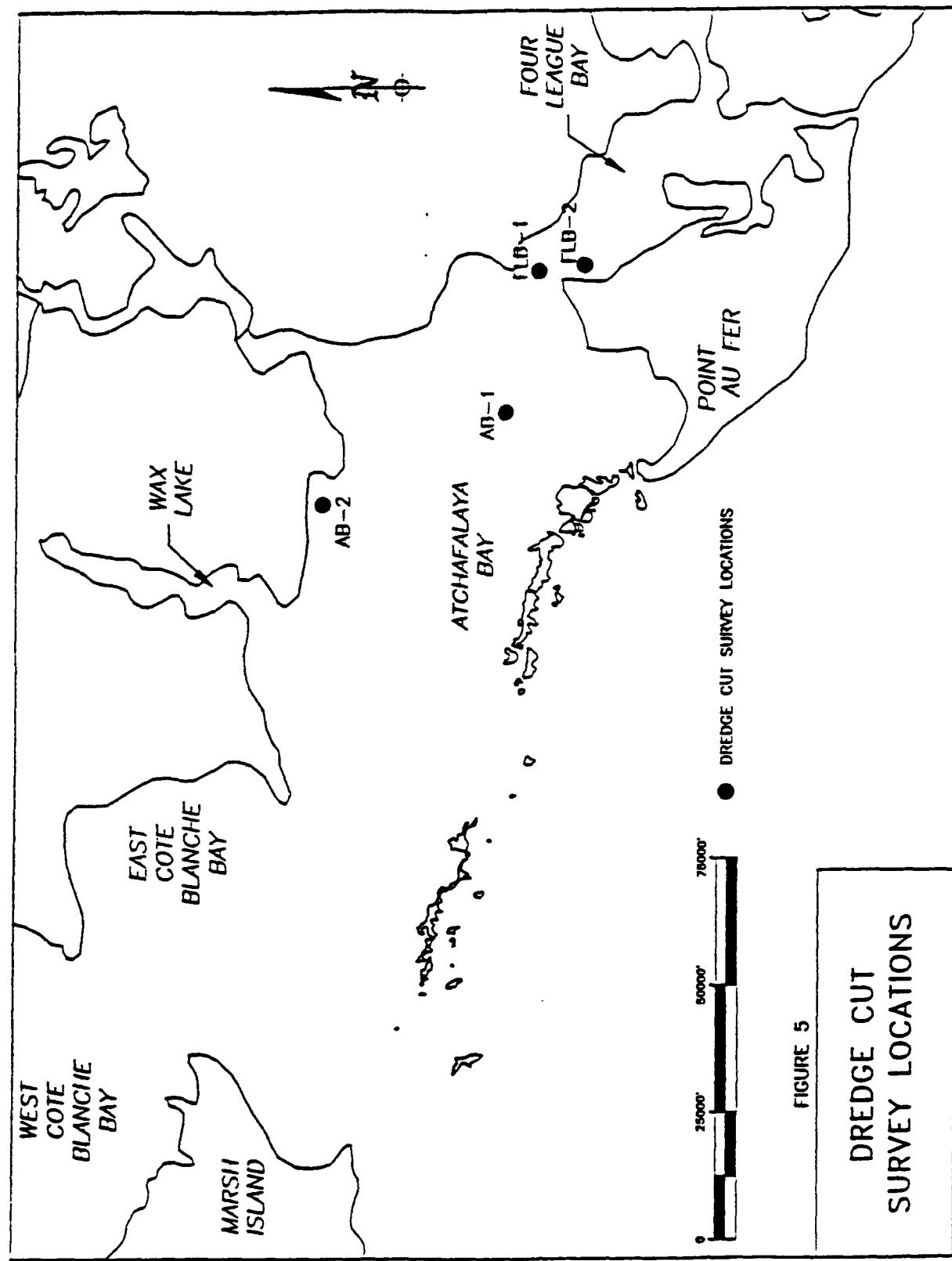
Sediments and finer shell particles excavated during the shell extraction process are deposited back into the dredge cut. These particles settle out of suspension at variable rates and cover the lower portion of the dredge cut. The precise rate of fill will be dependent upon the location of the trough, type and grain size distribution of the soil, hydrologic conditions, area river flows, wind and tidal actions, currents and storms. Some information on fill rates is available from several dredge cut surveys conducted by Dravo in Atchafalaya Bay and Four League Bay. No dredging has been conducted in the project area, and therefore data on the filling rate of dredge cuts are not available.

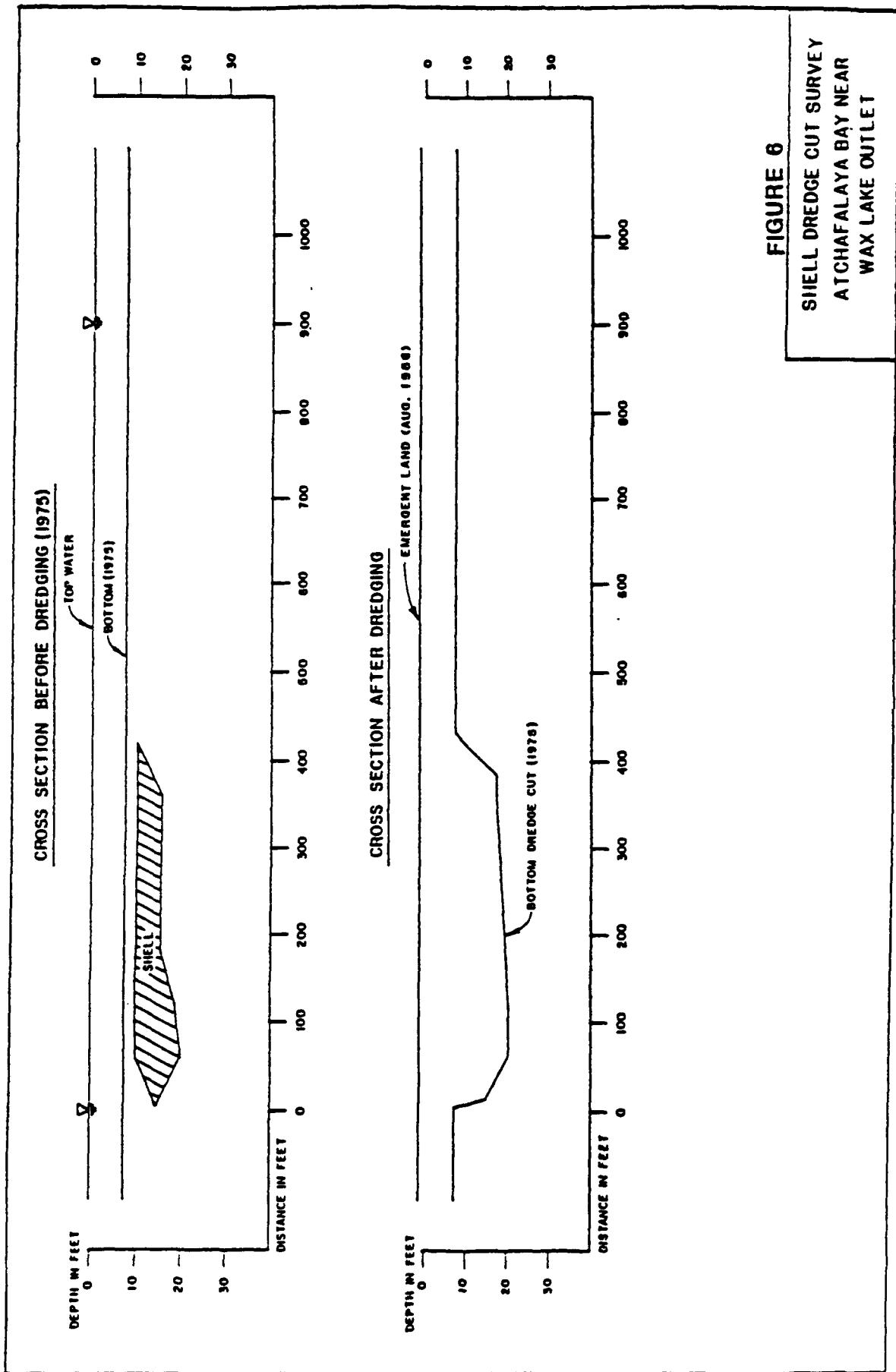
Locations of dredge cut surveys conducted in Atchafalaya and Four League Bays are shown in Figure 5. Dredge cut cross-sections obtained from the surveys are shown in Figure 6. Dredge cut characteristics for these areas are given in Table 3.

Deltaic development and coastal progradation significantly affect the bathymetry of Atchafalaya Bay, especially near Wax Lake Outlet, and portions of Four League Bay. A high sedimentation rate characterizes these areas because of the partial diversion of sediment-rich Mississippi River water through the Atchafalaya River and Wax Lake Outlet. Near the Wax Lake Outlet in Atchafalaya Bay the effect is particularly dramatic. To illustrate, by 1986 a 12-foot deep dredge cut made in 1975 had so completely filled in, emergent land had developed. Additional evidence comes from a survey of four separate dredge cuts in Atchafalaya and Four League Bay areas.

Atchafalaya Bay dredge cut AB-1 is located in southeastern Atchafalaya Bay between the Atchafalaya River Channel and South Point at the opening to Four League Bay. Prior to dredging in 1980, the bottom depth was 5 feet. In 1980, a dredge cut measuring approximately 850 feet in width and 20 feet in depth was excavated. In August 1984, the dredge cut was re-surveyed. In this four year period, 15 feet (75%) of the dredge cut had been filled and a 5 foot trough remained. The dredge cut was again surveyed in August 1986. By this time, an additional 4 feet of the dredge cut had been filled, so that by August 1986, 19 feet (95%) of the dredge cut had been filled and only a 1 foot trough remained.

Atchafalaya Bay dredge cut AB-2 is located in northern Atchafalaya Bay. Prior to dredging in 1985, the bottom depth in the area was 5 feet. In 1985, a dredge cut measuring approximately 1100 feet in width and 10 feet in depth was excavated. In August 1986, the dredge cut was re-surveyed. In this one year period, 7 feet (70%) of the dredge cut had been filled and a 3 foot trough still remained.





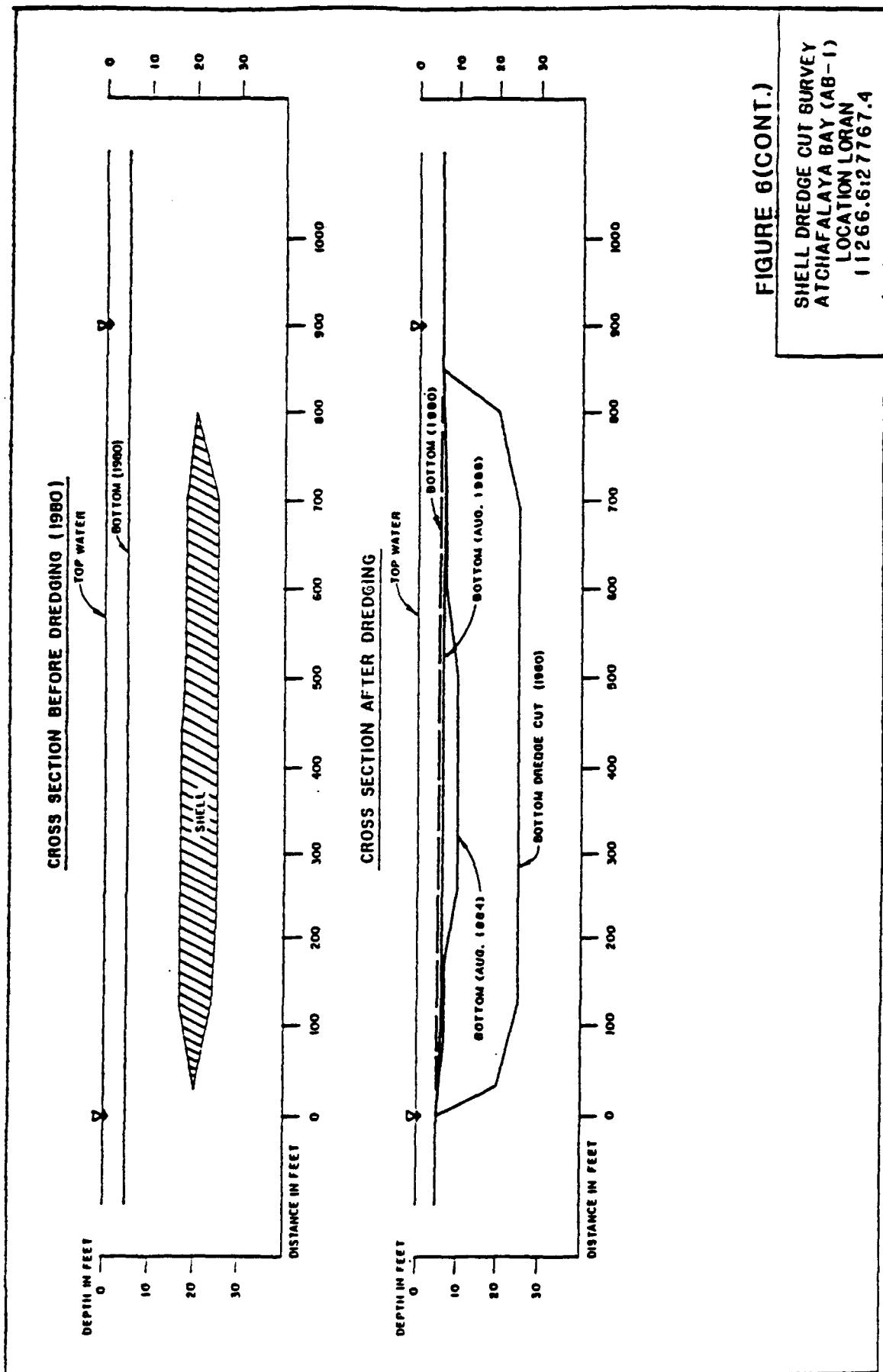
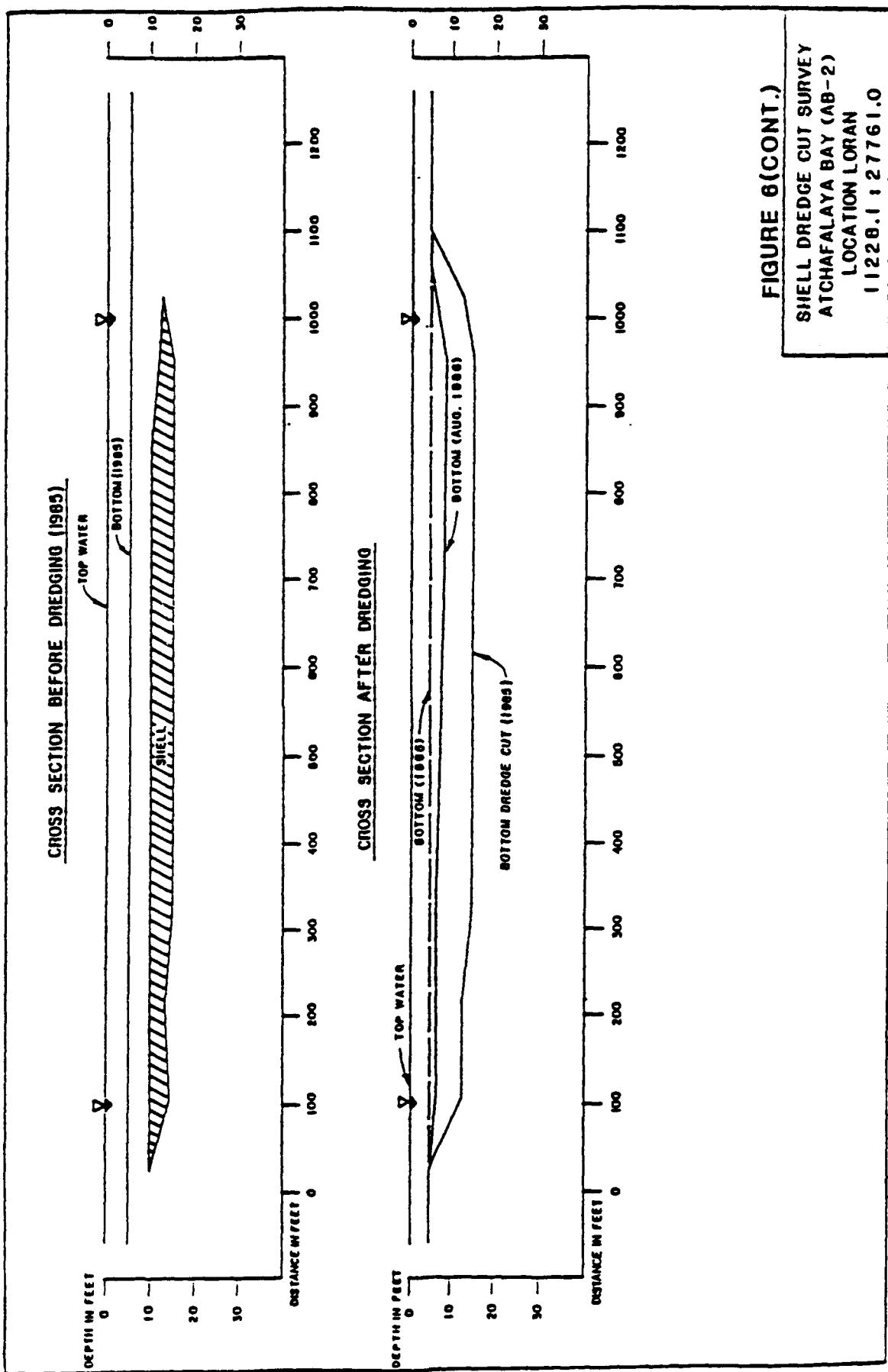


FIGURE 6 (CONT.)

SHELL DREDGE CUT SURVEY
ATCHAFALAYA BAY (AB-1)
LOCATION LORAN
11266.6127767.4

FIGURE 6 (CONT.)

SHELL DREDGE CUT SURVEY
ATCHAFALAYA BAY (AB-2)
LOCATION LORAN
1122B.1 127161.0



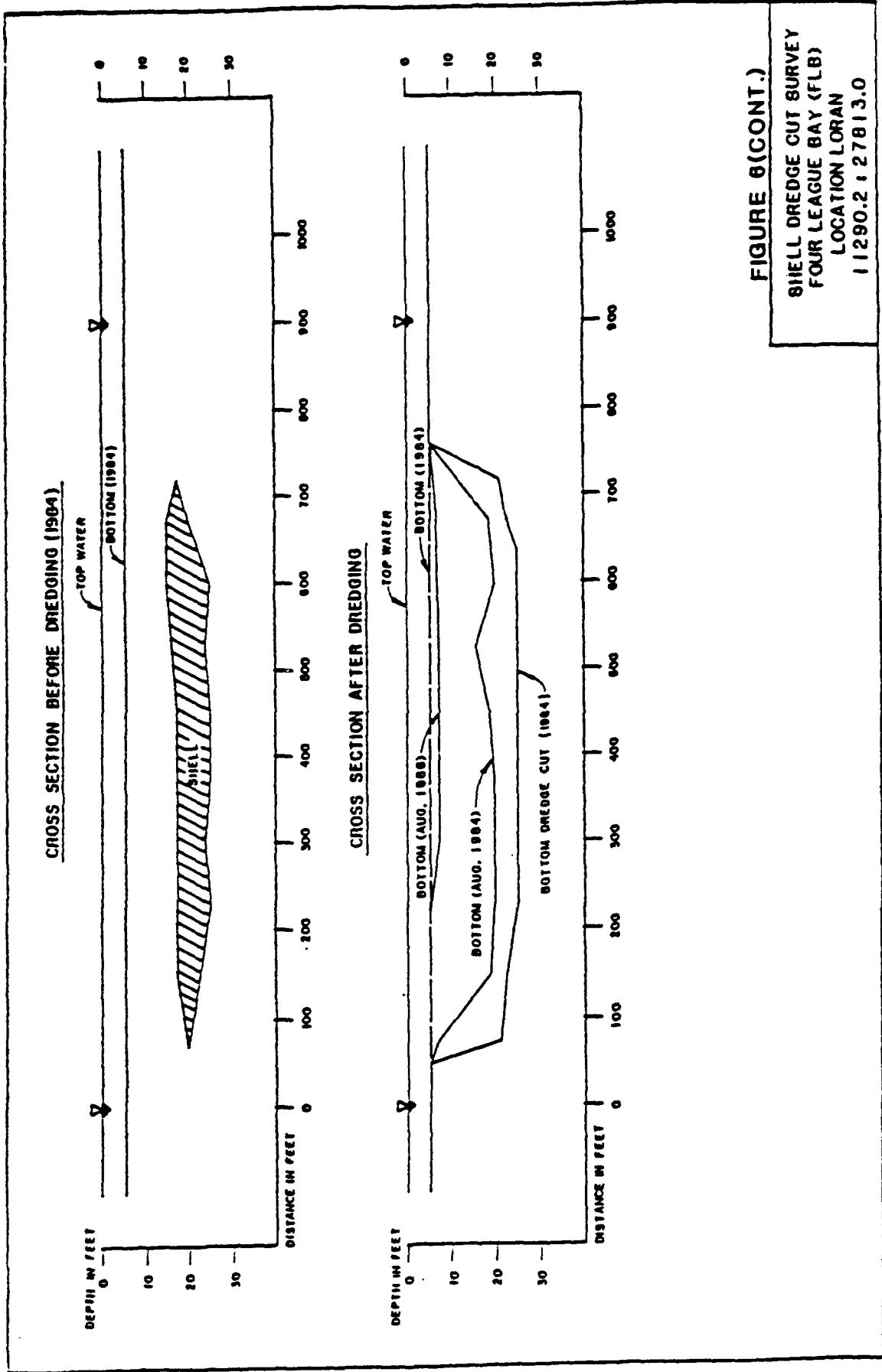


FIGURE 6 (CONT.)
SHELL DREDGE CUT SURVEY
FOUR LEAGUE BAY (FLB)
LOCATION LORAN
11290.2 + 27813.0

SHELL DREDGE CUT SURVEY
 FOUR LEAGUE BAY (FLB-1)
 LOCATION LORAN
 11287.9 : 27818.4

FIGURE 6 (CONT.)

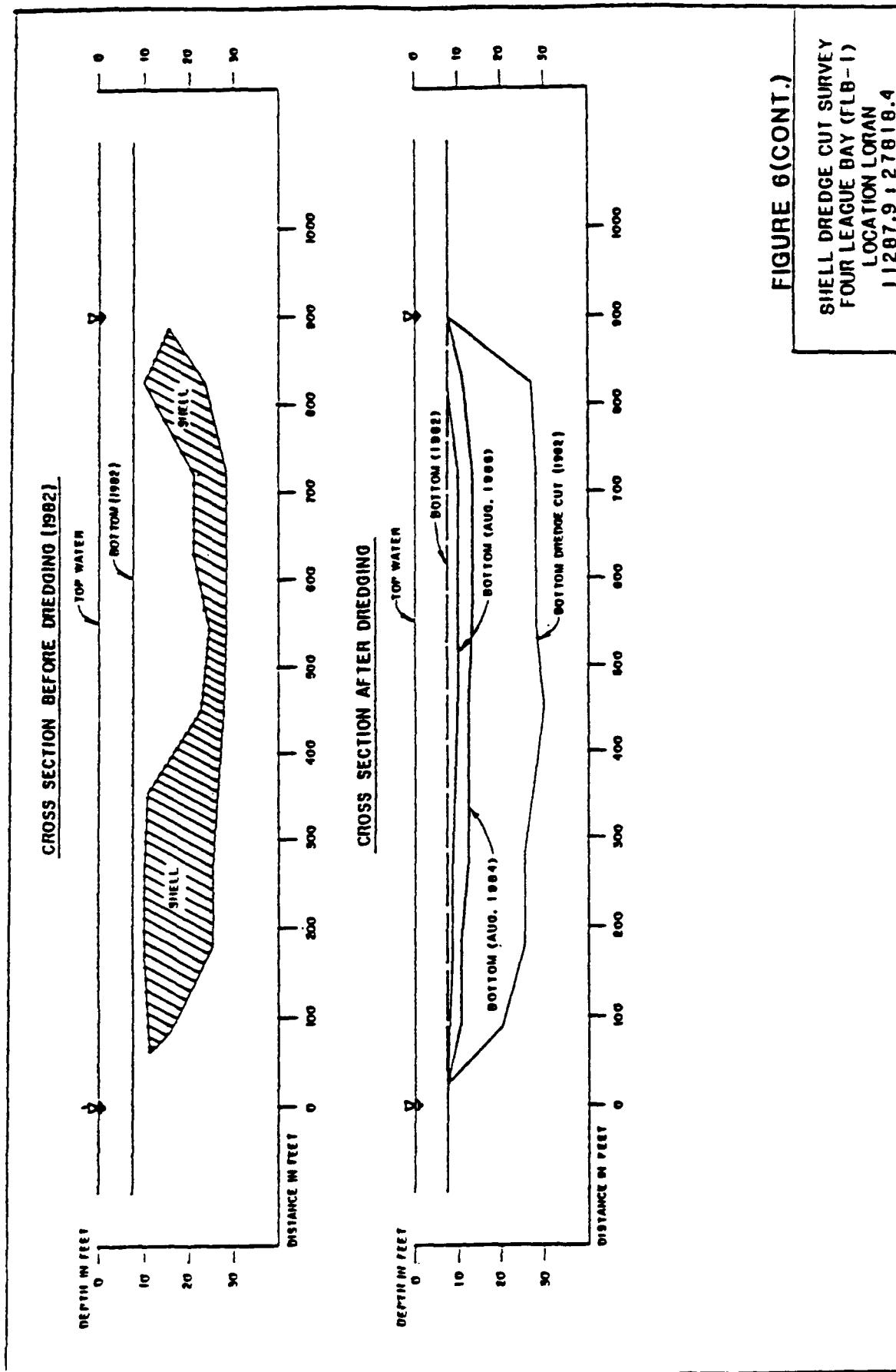


TABLE 3
CHARACTERISTICS OF DREDGE CUTS
FILLING FOR ATCHAFALAYA BAY AND FOUR LEAGUE BAY

	Bottom Depth Before Dredging (ft)	Approx. Dredge Cut Width (ft)	Dredge Cut Max. Depth (ft)	Max. Bottom Depth, Aug.'84 (ft)	% filled	Max. Bottom Depth, Aug.'86 (ft)	% filled
1975	8	425	20	—	—	0	100
1980 (AB-1)	5	850	25	10	75	6	95
1982 (FLB-1)	8	900	30	14	73	10	91
1984 (FLB-2)	6	700	25	20	26	8	89
1985 (AB-2)	5	1100	15	—	—	8	70

Source: DRAVO, 1986.

Four League Bay dredge cut FLB-1 is located near the opening of Four League Bay into Atchafalaya Bay. Prior to dredging in 1982, the bottom depth was 8 feet. In 1982, a dredge cut measuring approximately 900 feet in width and 22 feet in depth was excavated. In August 1984, the dredge cut was re-surveyed. In this 2 year period, 16 feet (73%) of the dredge cut had been filled and a 6 foot trough remained. The dredge cut was again surveyed in August 1986. By this time, 20 feet (91%) of the dredge cut had been filled and a 2 foot trough remained.

Four League Bay dredge cut FLB-2 is located southwest of South Point and south of FLB-1. Prior to dredging in 1984, the bottom depth in this area was 6 feet. In 1984, a dredge cut measuring approximately 700 feet in width and 19 feet in depth was excavated. In August 1984, the dredge cut was re-surveyed. In this period, 5 feet (26%) of the dredge cut had been filled and a 14 foot trough remained. The dredge cut was again surveyed in August 1986. By this time, 17 feet (89%) of the dredge cut had been filled and a 2 foot trough remained.

In summary, dredge cuts in Atchafalaya and Four League Bays fill at various rates. Rates of fill decrease from as much as 10 feet per year to as little as 2 feet per year as time since dredging passes.

What are the fill rates likely to be for troughs in the proposed project area? There are no comparable fill rate data. Therefore, relative rates can be inferred from existing data from nearby locations and examining what might be corollary situations.

The bathymetry of the nearby coastal bays is greatly affected by the sediment transport/movement dynamics of the Atchafalaya River system. The geographic extent of that influence also extends into the nearshore GOM inclusive of the proposed shell dredging project area. To illustrate, consider that the Atchafalaya River navigation channel transects the shallow coastal bays as well as the nearshore GOM portion of the proposed project area. The channel may be thought of as a maintained depression in the bays and the nearshore GOM. For the

period 1976 - 1985 an average of 5.5 million cubic yards of material per year was removed from the GOM reaches of the channel to maintain navigation, with about one million cubic yards of that total removed from the GOM portion and returned to the nearshore GOM. That's enough material to completely fill the troughs left by two dredges, each directly disturbing about one acre each day for 15 days, and not returning any of the sediments to the cut.

In addition to the influence of the Atchafalaya River, the bathymetry of the nearshore GOM is also influenced by the sediment transport/movement patterns of the Mississippi River and the action of the nearshore currents of the GOM. Additionally, the GOM wave energy regimes also affect sediment movements and bottom depths and contours. Thus, the proposed project area is located in a very dynamic and sediment rich portion of the nearshore GOM where water depths and bottom contours are influenced by forces and processes that affect a geographic area much larger than the proposed project area.

3.3.4.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Troughs created in the nearshore GOM should exhibit a fill pattern similar to the one observed in the coastal bays. Troughs begin to fill rapidly at first. As time passes, the rate troughs continue to fill progressively diminishes. The time to completely fill a trough created in the nearshore GOM should be about the same as it is to fill a trough in the coastal bays because of the dynamics of the nearshore GOM environment. Thus, the creation of temporary troughs (bathymetric depressions) in the nearshore GOM from shell dredging is expected to have a localized impact on sediment dynamics at and in the immediate vicinity of the trough itself. Accordingly, the potential for shell dredging to adversely affect nearby shorelines or wetlands could be

reduced or eliminated by restricting how close shell dredging occurs to important landscape features. With adequate consideration of localized impacts, shell dredging is not expected to have a significant adverse impact on the sediment dynamics of the nearshore GOM.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

Since this area has never been dredged for shells, there are no existing holes or troughs from shell dredging. This alternative would insure that the area would continue to remain free of dredge holes.

3.4. MINERAL RESOURCES

3.4.1. Existing Conditions

Mineral resources of the immediate project area primarily consist of petroleum, natural gas, and oyster shell. Presently, oyster shell is not extracted from the project area. Shell is, however, being produced from the adjacent water bottoms of East Cote Blanche Bay and Atchafalaya Bay.

Sites of major shell concentrations in the project area have been preliminarily identified by Dravo Basic Materials survey crews (Figure 7). Based upon previous shell production rates of 1.6 to 1.7 MCY per year, it can be estimated that shell reserves from the proposed project area can support the industry for an additional five to eight years depending on the rate of extraction.

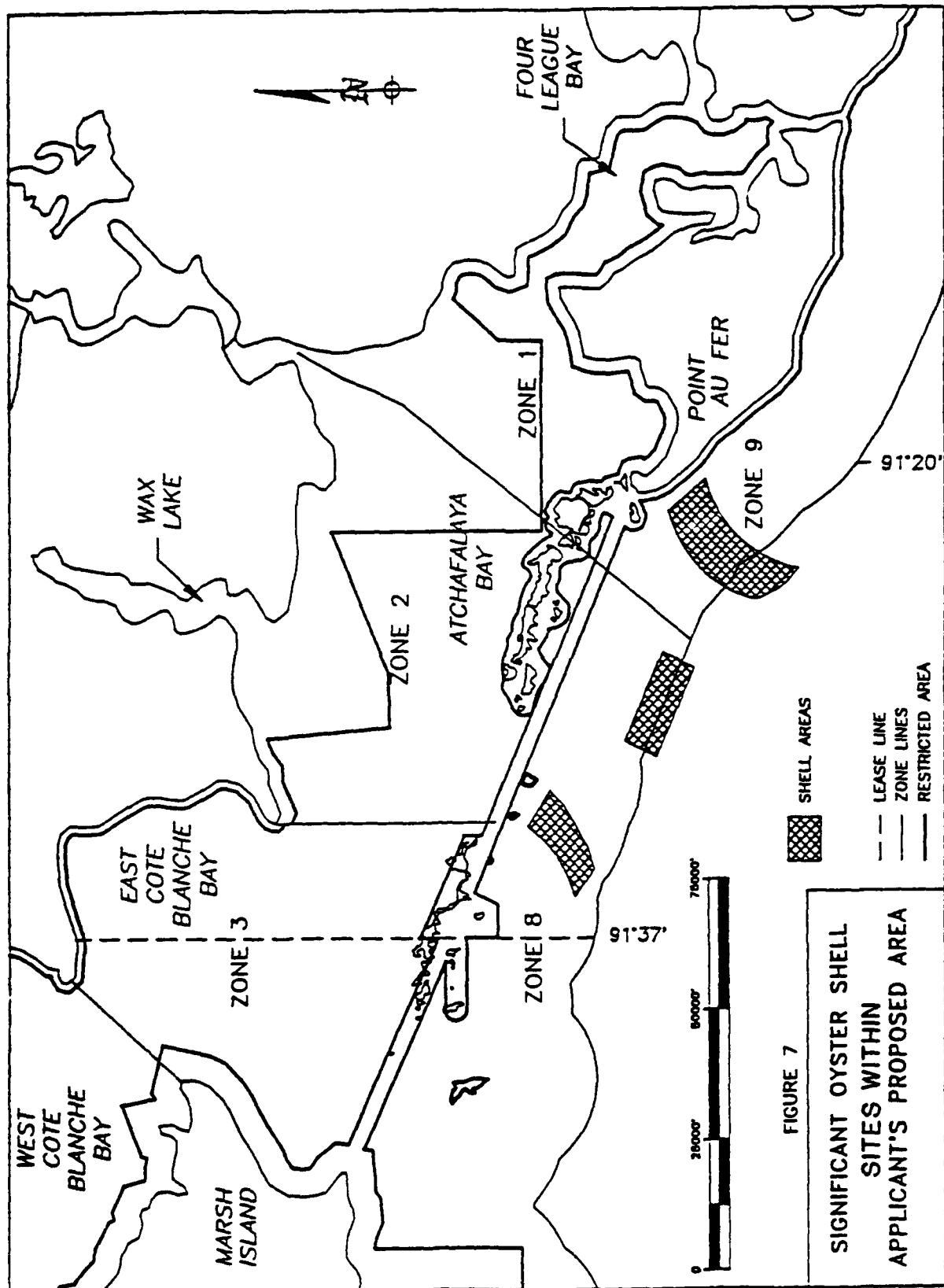


FIGURE 7
SIGNIFICANT OYSTER SHELL
SITES WITHIN
APPLICANT'S PROPOSED AREA

At present, oyster shell is being excavated from the water bottoms of East Cote Blanche and Atchafalaya Bays. The volumes of shell excavated by the former operator, Dravo, yearly for the period of 1975 to 1990 are shown in Table 4. Total production for this period by Dravo was 40.9 MCY of shell. Overall, annual shell production for this period has declined with a maximum of 3.2 MCY produced in 1977 and a minimum of 1.6 MCY produced in 1990. Production in 1991 was interrupted by the termination of the existing lease and was resumed by the present lessee, Louisiana Dredging Company, in February, 1992. Volumes of shell produced and royalties paid by applicant through 1992 are also shown in Table 4.

Petroleum and natural gas resources occur extensively within the project area. Figure 8 shows the major producing fields and pipeline locations within and immediately adjacent to the project area.

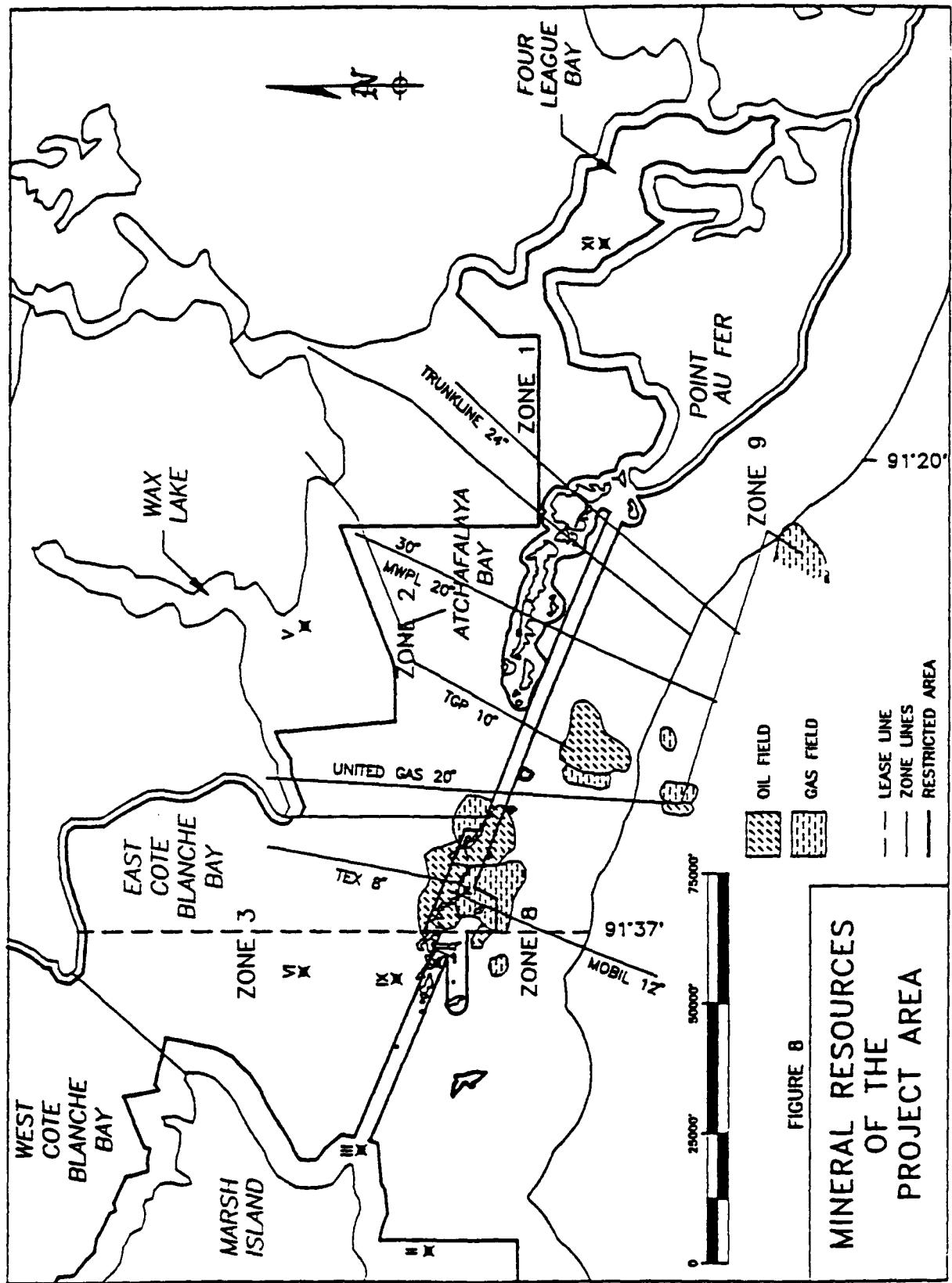
Published maps and independent magnetometer surveys performed by the dredging company are utilized to identify and locate pipelines within the dredge area.

If a pipeline is located by magnetometer survey near a reef, the pipeline is sounded by pole and flagged every 25 to 50 ft. along its length. A safety zone is marked with a row of flagged stakes 50 ft. to either side of the line. No part of the dredge encroaches within the 50 ft. safety zone. Pipeline owners are notified of all operations near the line.

TABLE 4
OYSTER SHELL PRODUCTION AND ROYALTY
AND SEVERANCE TAXES PAID BY DRAVO
1975-1991

<u>Year</u>	<u>Production (cu yd)</u>	<u>Royalty Tax</u>	<u>Severance Tax</u>
1975	3,106,254	\$ 468,054.65	\$ 93,210.93
1976	2,852,277	\$ 427,332.26	\$ 85,589.81
1977	3,204,044	\$ 480,731.69	\$ 96,145.34
1978	2,846,715	\$ 427,104.96	\$ 85,422.79
1979	2,768,742	\$ 427,215.31	\$ 82,833.08
1980	2,597,167	\$ 389,672.75	\$ 78,134.52
1981	2,325,203	\$ 350,159.93	\$ 69,773.57
1982	1,747,096	\$ 436,774.01	\$ 52,412.88
1983	3,199,086	\$ 831,762.43	\$ 95,972.59
1984	3,056,691	\$ 822,249.96	\$ 115,621.97
1985	2,960,226	\$ 828,863.33	\$ 133,210.18
1986	2,662,274	\$ 772,059.61	\$ 119,802.35
1987	2,403,940	\$ 704,354.47	\$ 108,177.31
1988	1,770,486	\$ 813,980.68	\$ 79,671.90
1989	1,726,414	\$ 1,555,873.18	\$ 77,688.65
1990	1,679,932	\$ 1,552,108.33	\$ 75,818.79
1991	1,683,612	\$ 1,602,574.00	\$ 75,835.00
1992*	351,600	\$ 938,712.00	\$ 15,822.00

* Data from present lessee and applicant



3.4.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

This alternative would allow the extraction of oyster shell from the water bottoms of the project area. At present, limited data exists regarding the volume of shell resources in the project area. Based upon annual shell production of approximately 1.6 to 1.7 MCY, it is estimated that shell can be produced from this area for 5 to 8 years. Shell resources which exist in the restricted zones would remain undredged.

Shell dredging would have no impact on the oil and gas resources within the project area.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

Implementation of this alternative would have no effect on the oil and gas resources of the area.

3.5. HYDROLOGY AND WATER QUALITY

3.5.1. Introduction

The types, locations and extent of emergent land and water bottoms in the project area are primarily related to past and present distributary activities of the Mississippi River. The large sediment load introduced into Atchafalaya Bay through the Wax Lake Outlet and Lower Atchafalaya River affect both water quality and sediment deposition throughout the area (Wells and Kemp, 1982). Due to the interrelationship between the hydrology, water quality and the near surface bottom sediments, these aspects of the physical environment will be discussed together.

The types of organisms found in an aquatic habitat are directly related to the water column water quality and sediment characteristics of the habitat. The numbers and distributions of organisms present both in the water column and in the bottom sediments are affected by seasonal, temporal and spatial variations in water quality parameters and sediment characteristics. The coastal waters along the central Louisiana coast vary significantly in salinity, temperature, dissolved oxygen concentrations, suspended sediment loads, turbidity, fecal coliform bacteria concentrations and nutrient concentrations depending on season, tidal stage, Atchafalaya River discharge, wind direction, intensity and duration, rainfall, and the effects of hurricanes and other storms. Bottom sediment characteristics depend on the interplay of erosional and depositional processes occurring throughout the central Louisiana coast as well as the impacts of various types of dredging for navigation, shell extraction, mineral exploration and pipeline construction.

3.5.2. Existing Conditions of Water Column/Sediment Quality

The project area falls within the coastal portions of Atchafalaya and Terrebonne Water Quality Management Basins. These basins are affected to different degrees by various coastal, riverine and meteorological processes and as such will be discussed separately. Water quality uses and standards for the project area have been set by the Louisiana Department of Environmental Quality, Office of Water Resources, Water Pollution Control Division (LDEQ-WPCD, 1989). These uses and standards are listed in Table 5. The possible water quality use classifications are A) primary contact recreation, B) secondary contact recreation, C) propagation of fish and wildlife, D) public water supply, E) oyster propagation, F) agriculture and G) outstanding natural resource waters. The project area is classified for uses A, B, C and E.

TABLE 5
WATER USES AND STANDARDS

WDW ¹ BASIN	BASIN SEGMENT DESCRIPTION	DREDGING ZONE(S)	WATER USES ²			STANDARDS pH RANGE	BACTERIAL ⁴ STANDARDS	TEMP ⁵ (°C)	TDS (mg/l)
			A	B	C				
A	Atchafalaya Basin Gulf Waters	8-9	x	x	x	N/A	N/A	5.0	6.5 TO 9.0
1	Terrebonne Basin Gulf Waters	9	x	x	x	N/A	N/A	5.0	6.5 TO 9.0

(1) BASINS: A = ATCHAFALAYA
1 = TERREBONNE

(2) WATER
USES:

A = PRIMARY CONTACT RECREATION
B = SECONDARY CONTACT RECREATION
C = FISH AND WILDLIFE PROPAGATION
E = OYSTER PROPAGATION

(3) NOT LESS THAN STANDARD
(4) STANDARD 4: OYSTER PROPAGATION
(5) NOT TO EXCEED

Bacterial standards for the various use classifications are as follows:

- 1) Primary Contact Recreation--Based on a minimum of not less than 5 samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100 ml, nor shall more than 10 percent of the total samples during any 30-day period exceed 400/100 ml.
- 2) Secondary Contact Recreation--Based on a minimum of not less than 5 samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 1,000/100 ml, nor shall more than 10 percent of the total samples during any 30-day period equal or exceed 2,000/100 ml.
- 3) Public Water Supply--The monthly arithmetic mean of total coliform most probable number (MPN) shall not exceed 10,000/100 ml, nor shall the monthly arithmetic mean of fecal coliforms exceed 2,000/100 ml.
- 4) Oyster Propagation--The fecal coliform median MPN (most probable number) shall not exceed 14 fecal coliforms per 100 ml, and not more than 10 percent of the samples shall exceed an MPN of 43 per 100 ml for a five tube decimal dilution test in those portions of the area most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions.

Because the most restrictive standard applies for an area with multiple uses, the entire project area falls under the oyster propagation standard.

Although technically outside the project area, salinity data from Eugene Island provides one of the longest continuous records in the central Louisiana Coast and is adjacent to Zones 8 and 9. Salinities at Eugene Island have ranged from freshwater to 36.3 ppt, with mean monthly salinities ranging from freshwater to 16.5 ppt. These salinity values are lower in the late spring when the Atchafalaya discharge is high and higher in the later summer and fall when river discharge is low. This indicates the project area is extremely dynamic and potentially stressful to organisms that require more moderate and stable salinity regimes.

Water temperatures at Eugene Island in Atchafalaya Bay, taken from Corps of Engineers data ranged from 4.2°C to 31.6° over 166 observations, with a mean of 18.3° over the period 4/73 - 1/81. The pH values at this station averaged 7.73 units, with a range of 3.4 to 9.7 pH units. The average was calculated over 137 observations during the period 4/73 - 1/81. Dissolved oxygen data from Eugene Island range from 3.4 - 13.3 mg/l. The average value of 136 readings over the period 4/73 - 1/81 was 7.6 mg/l. The summer bottom hypoxia (low dissolved oxygen concentrations) conditions that sometimes occur in deeper offshore coastal waters (Ragan *et al.*, 1978a; Turner and Allen, 1982a, b) are not known to occur in the shallow waters within the three mile territorial limit of the coastal dredging zones; however, this may be due to a lack of sample data. This lowered dissolved oxygen condition is related to density stratification of the water column and inorganic and organic nutrients from the freshwaters of the Mississippi and Atchafalaya Rivers (Rabalais and Boesch, 1985).

Turbidity data and Fecal Coliform data for Eugene Island were collected by DHHR beginning March 1971. From that time through September 1986, 28 readings were taken. Turbidity data ranged from 0.0 ppm SiO₂ to 224 ppm SiO₂. Readings were lower in the late spring. Fecal coliform measurements ranged from 2 org/100 ml to 1600 org/100 ml.

Water quality values collected by GSRI (1977) for each of the biological sampling areas within the proposed dredging area located on Figure 11 are given below:

	TSS (ppm)	Turbid- ity (NTU)	DO (ppm)	Tempera- ture (°C)	pH	Salin- ity (ppt)	Conduc- tivity (umhos)
AREA IV							
Winter	90.2	26	9.4	14.0	7.2	1.5	9000
Spring	76.3	50	8.1	24.5	6.7	1.0	1600
Summer	108.5	29	6.2	30.0	7.7	7.0	13000
Fall	43.4	17	9.0	17.0	6.1	3.0	4250
AREA VIII							
Winter	362.1	135	8.4	13.1	7.2	1.0	*
Spring	63.4	65	8.1	24.0	7.6	2.0	3700
Summer	135.5	10	6.7	30.0	7.4	18.0	32000
Fall	157.5	65	8.9	14.0	6.5	8.5	12000
AREA X							
Winter	84.4	29	12.0	14.5	7.1	2.0	*
Spring	34.7	22	8.5	22.5	6.4	2.0	3500
Summer	87.9	6	6.0	29.0	7.5	7.0	16300
Fall	49.1	13	9.9	15.0	6.0	1.5	2700

* denotes missing data

Water quality data taken by the Army Corps of Engineers (1982) for the disposal of dredged material from the Atchafalaya River Channel just south of the project area show similar results, although the influence of more saline water is evident in the generally higher pH and salinity concentrations. Dissolved concentrations were at or near saturation on the days sampled.

Major sources of pesticides, nutrients, oil and grease, heavy metals and other pollutants in the project area would be associated with the major rivers discharging into the coastal bays and offshore areas. The Wax Lake Outlet and Lower Atchafalaya River are distributaries of the major North American river system that drains a large portion of the urban, industrial and agricultural land in the U.S. Although they discharge into Atchafalaya Bay and not the project area, the magnitude of the discharge affects water quality over much of coastal Louisiana.

The presence of some heavy metals, pesticides and other contaminants in low concentrations in the waters and sediments does not equate to these materials being toxic to water column and benthic organisms. These constituents are generally tightly bound to sediment particles and are not easily separated from the particles under conditions found at and in the vicinity of the proposed dredging location.

Data obtained by the U.S. Army Corps of Engineers on bottom material along the Atchafalaya channel from just northward of the Point Au Fer reef and seaward of the reef were examined, and these data show extremely low levels of metals and pesticides. The significant levels of constituents measured are shown in Table 6 and the map of sampling locations is given in Figure 9 (Demas, 1976; Demas and Higgins, 1977).

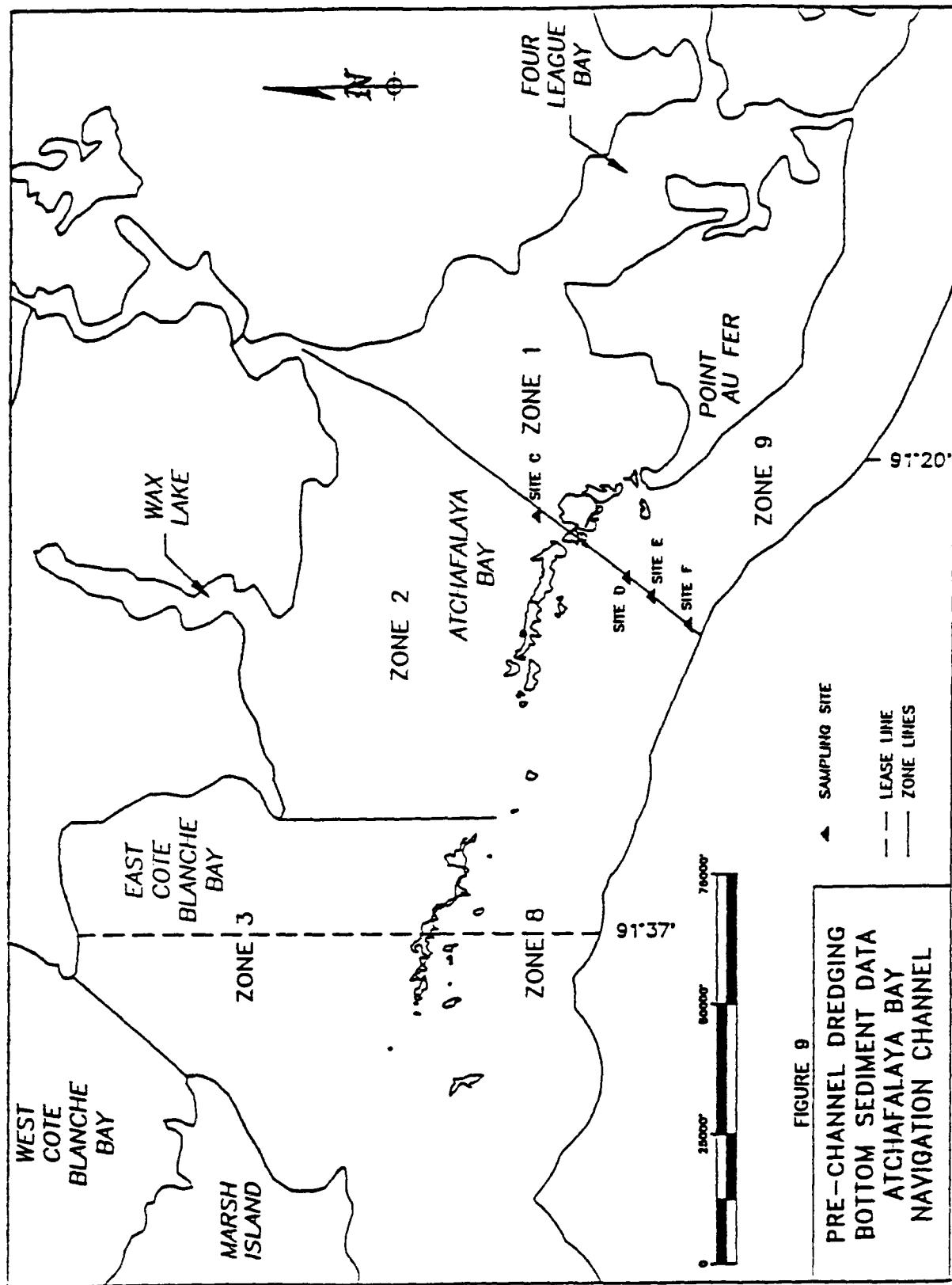
In the bottom sediments themselves, Total Kjeldahl Nitrogen (TKN) ranged from 84 mg/kg to 1600 mg/kg; however, in the elutriates from these sediment samples the values ranged from 0.32 to 6.4 mg/kg indicating that there is very little TKN which could be expected to enter the water column upon disturbance of the sediments. The same trends are evident in COD (Chemical Oxygen Demand) values.

TABLE 6
SELECTED CONSTITUENTS OF SEDIMENTS
ALONG ATCHAFALAYA BAY NAVIGATION CHANNEL

	Total Kjel. Nitrogen (TKN) mg/kg	Loss on Ignition mg/kg	COD mg/kg	Oil & Grease mg/kg	<u>Fluoride</u> TKN mg/kg	<u>COD</u> mg/kg
Site C*	1,500 84	67,300 9,520	40,000 1,600	1,000 1,000	0.56 0.32	14 18
Site D	1,300 1,300	56,800 56,800	38,000 37,000	1,000 1,000	1.6 6.4	27 -
Site E	1,300 1,100	60,500 55,700	37,000 35,000	1,000 1,000	1.8 2.6	- 120
Site F	1,600 1,400	55,300 67,600	28,000 33,000	1,000 1,000	1.4 1.2	- -

*Locations shown on Figure 9.

SOURCE: Demas, 1976.



Loss on ignition appears to be high, indicating that there are significant organic materials in the sediments. High organic levels also explain the high levels of COD and TKN.

Oil and Grease were measured at 1000 mg/kg. These levels are not extremely high considering the fact that the samples were taken along a ship channel and the fact that some oil and grease has its source in the natural environment.

The low levels or absence of detectable levels of heavy metals and pesticides would be expected to be similar throughout most of the study area. The levels of oil and grease in the project area sediments outside of the Ship Channel would be expected to be somewhat lower than those found along the Atchafalaya Ship Channel.

More recent data from the Army Corps of Engineers (1982) collected along the Atchafalaya River Channel just seaward of Point Au Fer reef for the disposal of dredged material show similar results. Trace metal concentrations were low as were trace metal concentrations in tissues of organisms collected from the vicinity of the samples. Oil and grease concentrations of bottom sediments were elevated as in the previous study. Elutriate tests done using these sediments revealed very low concentrations of trace metals released to the water column upon disturbance.

Results of elutriate analyses of water and sediment done by GSRI (1977) on Areas IV and X (Figure 11) showed no pesticide or metal concentrations of concern in either area. Low levels of zinc and copper were detected in both areas.

3.5.3.

Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

The holes/troughs left by shell dredging occupy only a very small area in comparison to the extent of the project area open to dredging. These holes refill at variable but fairly rapid rates depending on depth, location, river flows and other local hydrologic variables. In the project area, it is possible that holes may temporarily trap salt water causing a pocket of low dissolved oxygen water to form, primarily during the summer months. Summer related low dissolved oxygen concentrations within dredge troughs could cause fish to avoid them. However, fish may be attracted to dredge troughs during winter months when bottom temperatures would tend to be higher than the surrounding bottom waters and dissolved oxygen concentrations would be similar to the surrounding waters. If such stratification were to occur, it would not be likely to last very long because of the high degree of mixing in these shallow coastal areas. No significant adverse impacts to local hydrology are anticipated as a result of the temporary troughs left by shell dredging.

One of the major concerns associated with shell dredging is the reintroduction of toxic contaminants into the water column from the sediments, thereby making them available to the aquatic environment. Elutriate samples of native water and sediments taken from sites along the Atchafalaya Bay Navigation Channel and adjacent to the project area show that little of the contaminants in the bottom sediments are released back into the water column. Chemical oxygen demand (COD) and total kjeldahl nitrogen (TKN) were the principal compounds released at the low mg/l level. Some samples showed 1-2 ug/l rises in arsenic, copper and nickel with two samples showing 10 ug/l increases in zinc concentrations. The COD and TKN values rose due to the release of organic matter and inorganic nutrients from the sediments. The low

ug/l increases in arsenic, copper, nickel and zinc did not raise those concentrations to levels that are considered toxic to aquatic life, particularly at the generally higher pH and alkalinity levels in the project area. These increases in concentrations of nutrients and metals are temporary and have little impact due to mixing and dilution in the surrounding waters. Further discussion of water quality issues can be found in Response to Mr. Harold Schoeffler, letter dated May 27, 1993, Response #7.

The major impact of shell dredging is a temporary localized increase in turbidity and suspended solids in the vicinity of the dredge. Most of the project area is seasonally affected by the high turbidities and suspended solids concentration produced by a combination of the Atchafalaya River discharge and the configuration and wave energy in the bays. The highest surface turbidities and suspended solids associated with shell dredging occur within several hundred feet of the dredges (GSRI, 1977). The impact of high turbidities and suspended solids is limited to a small area immediately down current of the dredge and occurs in a seasonally high turbidity environment.

The small area affected by dredging, in comparison to the extent of the project area, limits the possible impacts on the water column. Much of the very high suspended solids associated with shell dredging move by gravity into the dredge cut, limiting the area affected by the fluid mud discharge.

Studies have shown that more than 95% of the suspended material from dredging settles out of the water column within the first 200 feet. The impact of this material is limited to about 2.88 acres for a maximum of two dredges (5.76 acres) at any one instant in time or 0.011% of the project area open to dredging. At an average forward movement of 150 feet per day, the area affected by suspended material would be about 4.3 acres per dredge or 8.6 acres for two dredges.

During a period from 2-29-84 through 1-29-86 a series of turbidity and suspended solids samples were taken and analyzed. The dredges were located in Atchafalaya and Four League Bays. Surface samplings were carried out at the bow and stern of each dredge (approximately 200 feet distance). On the same day several control stations, remotely located from the dredges, were also sampled. The data were obtained over 89 sampling days. The samples were collected by Dravo and the analyses were performed by Analysis Laboratories, Inc. It should be noted that the areas where the dredges operated, as well as the control areas, are affected markedly by the Atchafalaya River.

The following is a summary of the data from this turbidity/suspended solids study.

Summary

Turbidity/TSS Study (1984 - 1986)

Sample Locations		Turbidity (NTU*)	TSS (mg/l)
Background (Controls) - High	210	631	
	4	6	
	86	140	
Near Dredges	- High	2000	4314
Daily Maximum Values	Low	15	25
	Average	313	649
Difference Between the Near Dredge Values and the Background	- High	1952	4240
	Low	-0-	-0-
	Average	228	510

* Nephelometric Turbidity Units

The background values of these waters are fairly high in concentration of suspended material at times. The range of values is quite wide, illustrating a high degree of variability in both the suspended sediment load in the water column as well as the turbidity. The near dredge data represents only the maximum value on a day. If the stern reading was higher than the bow reading, the higher value was used. These data, like the background data, exhibit a high degree of variability. The levels near the dredge are dependent, to a large degree, on the type of overburden and the type and quantity of sediment within the reef being extracted. The table also lists the high, low and average differences between the near dredge and the background values. These are indicative of the rise above background in the immediate vicinity of the dredge.

In summarizing the results of this study and under the conditions encountered, the average TSS levels in the immediate vicinity of the dredge were approximately 650 mg/l (about 0.1 ounces/gallon) or about 510 mg/l above the background. Likewise the turbidity average was somewhat over 300 NTUs with an average 230 NTU rise above background levels.

In summary, the primary impacts of shell dredging on hydrology and water quality under existing permit restrictions are temporary holes/troughs and increases in turbidity and suspended solids in the vicinity of the working dredges. Sediment analyses and elutriate test data indicate that release of sediment-associated contaminants does not pose a significant hazard to the environment.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

No portion of the project area would be impacted by temporary increases in turbidity and suspended solids from shell dredging.

3.6. BIOTIC ENVIRONMENT

3.6.1. Botanical Resources

3.6.1.1. Algae and Phytoplankton

3.6.1.1.1. Existing Conditions

Algal masses exist on a variety of bottom substrates and in a wide range of salinities. The bottom sediments in the project area are typically muddy sand and clay. Theriot (1976) and Randall (1986) studied the phytoplankton of Atchafalaya, Four League, and West Cote Blanche Bays, which constitute the area just inshore from those portions of Zones 8 & 9 for which a permit is sought. Theriot has shown the phytoplankton of the region to be composed primarily of centric diatoms. Peak abundance has been recorded in August with lesser concentrations, corresponding to low river discharge, occurring October, November, May, and June. High river discharge brings large volumes of highly turbid water into the bays. The project area is also influenced by the turbid water of the river discharge, and phytoplankton population fluctuations probably follow the same pattern as observed inshore.

Barrett *et al.*, (1978) provide data on Chlorophyll *a* concentrations (a measure of phytoplankton mass) in the coastal waters near the project area. Average concentrations of Chlorophyll *a* generally decreased in a Gulfward direction.

3.6.1.1.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Shell dredging resuspends nutrients. This may result in some temporarily small increases in phytoplankton, because nutrients from the Atchafalaya River may be plentiful enough to minimize the impact of dredging-related increases. Phytoplankton biomass in the coastal waters is apparently highly impacted by seasonal factors such as river discharge and area wide salinity. Shell dredges also produce localized turbidity which may decrease light penetration to phytoplankton and benthic algae although these turbidity effects are highly localized and permit restrictions prohibit dredging in shallow, near shore areas.

The levels of contaminants released from bottom sediments during elutriate testing were extremely low and did not raise concentrations to levels which are considered toxic to aquatic life. The effects of released contaminants from bottom sediments are expected to have only minimal effects on phytoplankton productivity and the growth and survival of larval and adult crustaceans and finfish.

Turbidity from shell dredging would affect less than 9 acres of the project area per day. The volume of water discharged by the dredge Mallard per day is equal to about 0.03% of the total volume of water in the project area. The volume of water discharged per day by the dredge St. Charles is equal to about 0.02% of the total volume of water in the project area. Both percentages are negligible in the context of available water within the project area. The impact to populations of phytoplankton is associated with discharge water therefore negligible in the context of the project area.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

Permit denial would eliminate any impact of shell dredging on nutrient resuspension or turbidity and light penetration.

3.6.2. Zoological Resources

3.6.2.1. Fisheries/Nekton

3.6.2.1.1. Existing Conditions

The Louisiana fisheries market consists of several species of fish and shellfish. The primary types of fish collected along the Gulf and inshore waters include menhaden, spotted seatrout (speckled seatrout), white trout, mullet, red drum (redfish), Atlantic croaker, and sheepshead. The major shellfish caught in the inshore waters are blue crabs, white shrimp, brown shrimp and oysters. Both of these groups provide income and/or recreation to fishermen along the Louisiana coast and throughout the southeast region of the U.S.

Trawl sampling was done by GSRI (1977) at three locations in the project area on a quarterly basis for a year beginning November, 1975. Two of these locations were just south of exposed reef areas. The most abundant species in samples taken in these areas by otter trawl were the Atlantic croaker (Micropogonias undulatus) followed by the sea catfish (Arius felis). At the third area which was located farther offshore, the most abundant species were the Atlantic croaker (Micropogonias undulatus), the sand seatrout (Cynoscion arenarius) and the silver perch (Bairdiella chrysourus). At all sites, the spring and summer sampling periods were the most productive in terms of numbers of species and numbers of individuals. Similar species were found in trammel net samples taken in the same areas.

Monthly trawl samples were taken by Hoese (1976) south of Atchafalaya Bay during the period April 1975 - March 1976. The most abundant species were, in descending order; the Atlantic croaker, (Micropogonias undulatus); the sea catfish (Arius felis), and the bay anchovy (Anchoa mitchilli). The largest catches were reported in summer and fall samples. Studies by the Corps of Engineers for disposal of dredged material from the Atchafalaya River channel in the waters south of the project area also found a dominance of the Atlantic croaker.

Three trawl samples were taken by Steimle and Associates, Inc. in locations given in Figure 10 in Zones 8 and 9. Results of the three trawl samples are given in Table 7. Similar species were taken in this sampling as in previous studies, however the Atlantic croaker was absent from the samples. The paucity of specimens collected reflects the seasonal cycle reported in previous studies.

Studies in nearby and adjacent waters by Dugas (1975), Barrett *et al.* (1978), Juneau (1975), Ragan *et al.* (1978b), and Darnell *et al.* (1983) report similar species composition to that reported in the project area including the dominance of the Atlantic croaker and the sea catfish in the faunal assemblages.

The largest data base discussing the distribution and abundance of bottom fish and shrimp in the coastal area is Darnell *et al.*, (1983). This report summarizes the results of six prior studies including Ragan *et al.* (1978b) and covers the continental shelf from the Rio Grande to the Mississippi River. The results of the trawl data analysis were mapped to show seasonal or annual abundances of species along the continental shelf. Trawl samples taken on the shelf south of the project area showed the Atlantic croaker and hogchoker were the most abundant species.

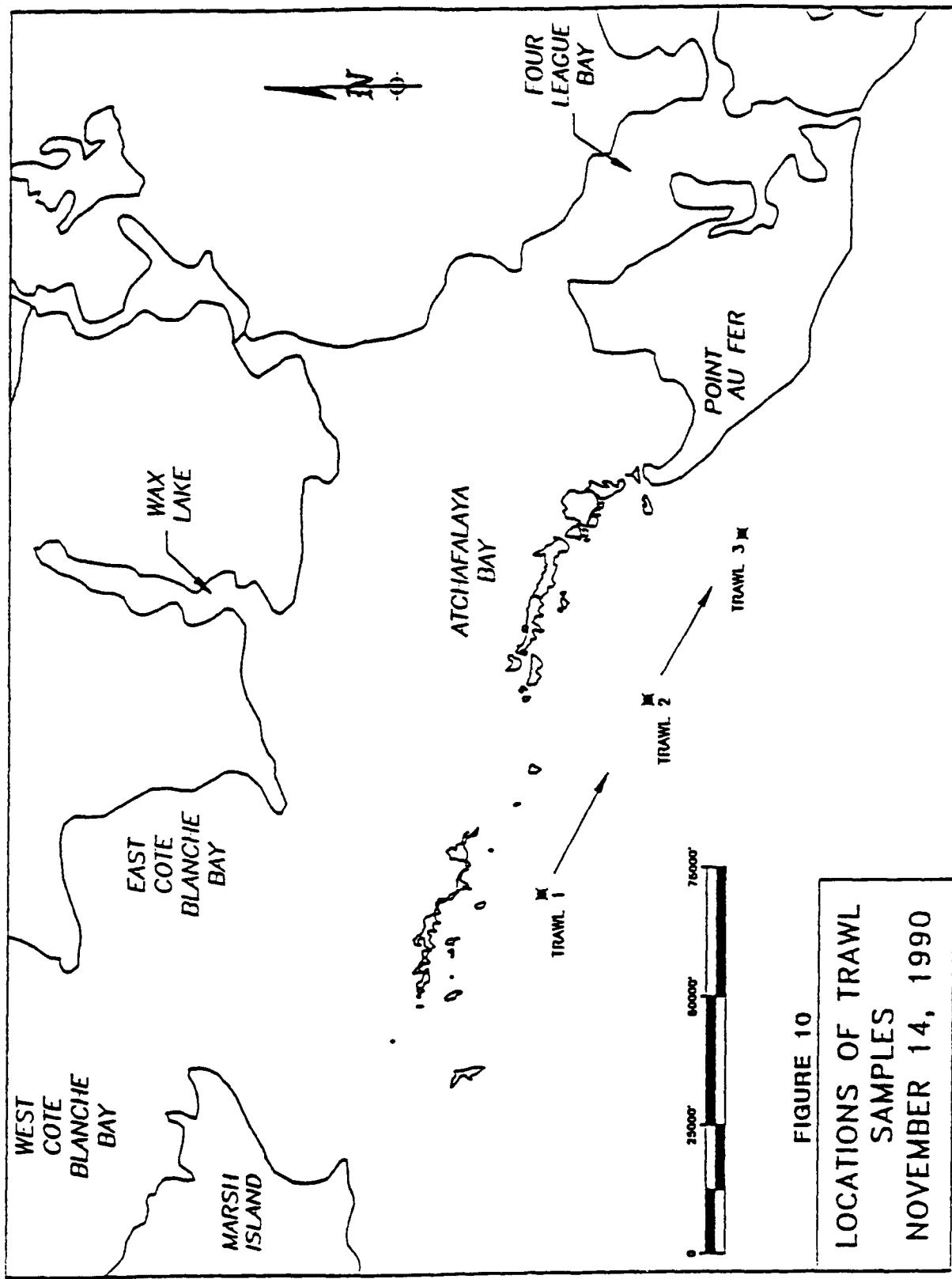


FIGURE 10
LOCATIONS OF TRAWL
SAMPLES
NOVEMBER 14, 1990

TABLE 7
RESULTS OF TRAWL SAMPLING NOVEMBER 14, 1990
ZONES 8 AND 9

TAXA	Trawl 1 Number x (TL)	Trawl 2 Number x (TL)	Trawl 3 Number x (TL)
Ctenophora	*		*
<u>Callinectes sapidus</u> (adult)	4	5	3
<u>Callinectes sapidus</u> (juvenile)	50	39	32
<u>Penaeus</u> spp.	249	208	150
Clupeidae			
<u>Clupea harengus harengus</u> (Atlantic herring)	3	10.9	5
Engraulidae			
<u>Anchoa mitchilli</u> (bay anchovy)	1	3.0	16
Argidae			
<u>Arius felis</u> (hardhead catfish)	1	11.0	
Scaenidae			
<u>Cynoscion arenarius</u> (sand seatrout)	3	8.9	19
<u>Bairdiella chrysoura</u> (silver perch)			
Unknown		2	2.8
Uranoscopidae			
<u>Astrotscopus yagaraecum</u> (southern stargazer)			1
Stromatidae			
<u>Peprius buriti</u> (Gulf butterfish)	2	3.8	16
<u>Peprius alepidotus</u> (harvestfish)			2
Triglidae			
<u>Prionotus tribulus</u> (bighead sea robin)	1	5.2	5.3

* Too numerous to count

A comprehensive list of the fishes commonly found in the marshes and water bodies of coastal Louisiana is given in Appendix D. This list is taken from Gosselink (1984) and Gosselink *et al.* (1979).

3.6.2.1.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Shell dredging produces localized, temporary increases in turbidity in the immediate vicinity of the dredge. Turbidity can theoretically cause gill clogging in fish, particularly juveniles. It may also decrease the ability of fish to feed if they depend heavily on sight for successful feeding. Shell dredging may also disturb spawning areas.

Fish and shellfish in the project area are adapted to life in an environment which is very often highly turbid. Mobile forms are able to avoid localized areas of high turbidity around shell dredges although the turbidity effects caused by shell dredging are generally found only a few hundred feet away from the dredge. As noted previously, a turbidity plume 200 feet in radius surrounding a dredge affects the turbidity to varying degrees of 2.9 acres of the water body at any one time. A theoretical maximum of two dredges operating simultaneously could affect turbidity over about 5.8 acres.

Acres of bottom disturbed and volumes of water affected by shell dredging are very small in relation to the dimensions of the lease area. This alternative therefore would have only minimal adverse effects on fisheries.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

All impacts of shell dredging turbidity to fish and shellfish, even though they are primarily of localized and temporary nature, would not occur with this alternative. Elevated turbidities will still prevail seasonally during periods of high river discharge.

3.6.2.2. Benthos

3.6.2.2.1. Existing Conditions

The waters of the project area are estuarine and heavily influenced by the discharge of the Atchafalaya River throughout the year. Lower salinities are therefore experienced during periods of high river discharge.

The most comprehensive data on the benthos of the project area are given in the GSRI (1977) study. Station locations sampled in this study are given in Figure 11. Three of these station locations (each station included multiple sample locations), areas IV, VIII and X, are located in or very near to the project area. Station IV consisted of six separate sample locations, three of which were undredged and three of which were 40 year old dredge cuts. Fauna collected at these stations, including polychaetes, oligochaetes and molluscs were typical of soft bottom, oligohaline/mesohaline estuaries in Louisiana. Numbers of organisms varied seasonally, and variability in the data was high within stations as shown in Table 8. The study concluded that there was no difference in the abundance or distribution of aquatic biota in dredged or undredged areas and most differences were seasonal rather than related to dredging.

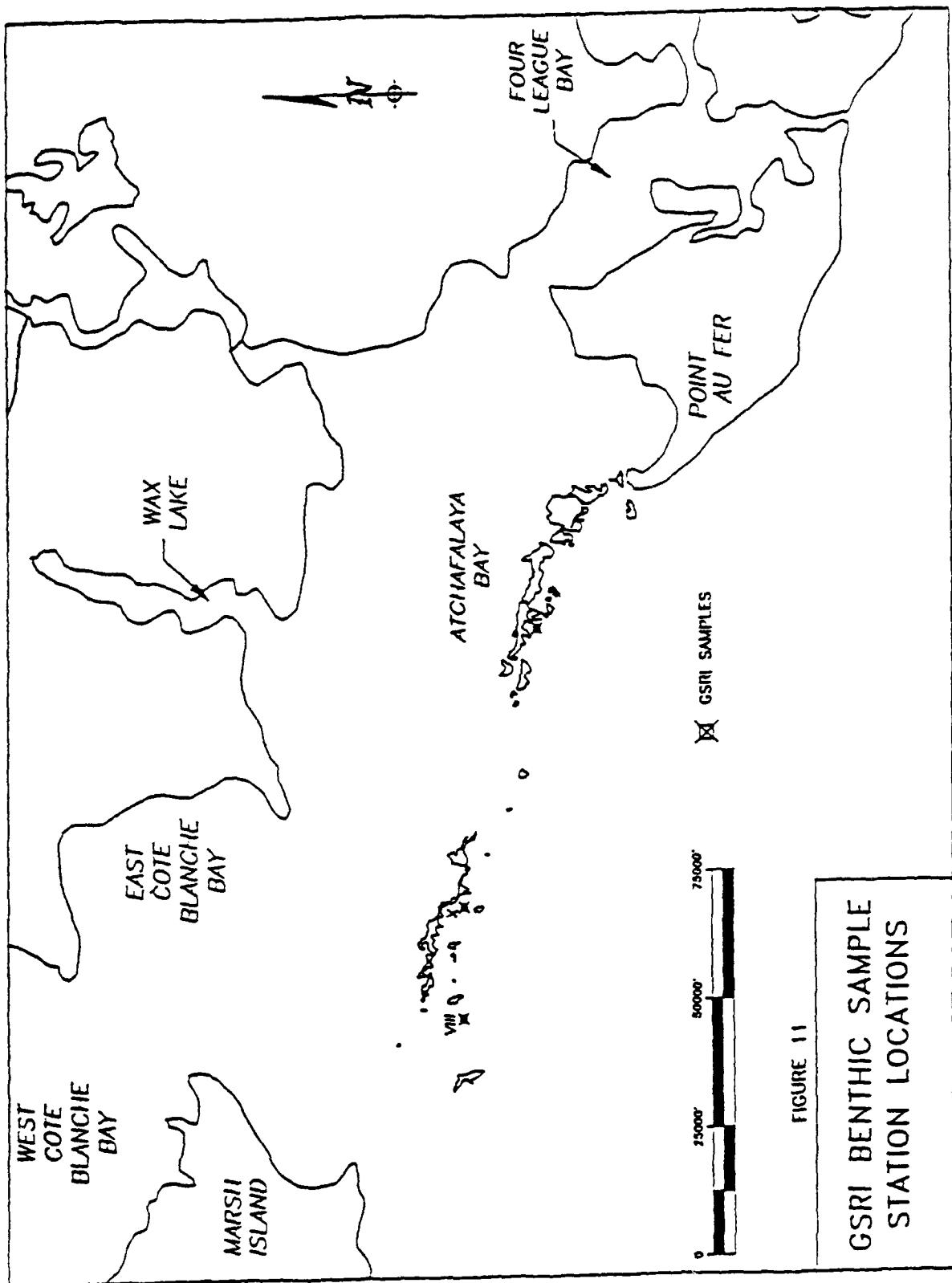


TABLE 8
RESULTS OF BENTHOS SAMPLING FROM SELECTED STUDY AREAS
(GSRI, 1977)
ZONES 8 AND 9

Sampling Area	Sampling Station	General Characteristics	Organisms/m ² (min)	Organisms/m ² (max)	Organisms/m ² (avg)	Organisms/m ² (avg)	Most Common Organisms	No. of Species (% of Total)
IV	A	Undredged	8.0 (winter)	944.4 (autumn)	346.3 (s - ± 431.3)	<u>Balanus</u> sp.	8 (11.0%)	
IV	B	40 year old dredge cut	44.4 (spring)	19.233 (summer)	5996.9 (s - ± 9081.7)	<u>Balanus</u> sp. <u>Gorgonites</u>	27 (37.0%)	
IV	C	Undredged	77.7 (summer)	1,966.5 (spring)	575.2 (s - ± 928.4)	<u>Balanus</u> sp.	16 (21.9%)	
IV	D	Undredged	33.3 (summer)	311.1 (autumn)	118.2 (s - ± 129.4)	<u>Micrura</u> <u>Paranatella</u>	7 (9.6%)	
IV	E	40 year old dredge cut	199.9 (summer)	808.8 (autumn)	407.8 (s - ± 323.2)	<u>Mytilopsis</u> <u>Balanus</u>	19 (26.0%)	
IV	F	40 year old dredge cut	11.1 (spring)	133.3 (autumn)	56.5 (s - ± 54.4)	Capitellidae	9 (12.3%)	
VIII	A	Mud Bottom	76.0 (winter)	455.5 (summer)	268.8 (s - ± 191.8)	Capitellidae	13 (17.8%)	
VIII	B	2 Year Old Dredge Cut	38.1 (winter)	444.4 (spring)	209.5 (s - ± 201.8)	Oligochaetes	13 (17.8%)	
X	A	Shell Bottom	133.3 (fall)	1,051.8 (spring)	451.9 (s - ± 430.7)	<u>Mytilopsis leucophaeta</u>	11 (15.1%)	
X	B	Mud Bottom	14.0 (winter)	177.7 (spring)	92.4 (s - ± 67.6)	<u>Rangia cuneata</u>	11 (15.1%)	

Area VIII encompassed two sampling stations, one an undredged site and one a two year old dredge cut. Variability was extremely high in numbers of individuals collected seasonally although the total species collected at each station were similar. Polychaetes were the dominant organism at the undredged station whereas Oligochaetes were dominant in the old dredge cut.

The two sampling areas at Station X provided a comparison of shell bottom and mud bottom areas. Similar numbers of species were encountered in both sampling locations. Variability was high in the numbers of organisms present. The Shannon Weaver (log 10) diversity indices calculated for both areas were low (<1) for all seasons.

Benthos sampled by the Army Corps of Engineers for disposal of dredged material from the Atchafalaya River channel in areas just south of the project area exhibited a dominance of polychaete fauna, primarily Mediomastus spp. This genus is common in the Northern GOM and generally found in substrates which vary from silt/clay to medium sand (Vittor and Associates, Inc., 1984). In general, the benthos of the offshore areas that are not restricted to dredging is that of low salinity environments although riverine influx may vary widely from season to season. Occasional invasion by species uncommon to the area (particularly mobile species) is usually associated with high salinity events. Most of the assemblages described in the literature are those which are common in soft bottom sediments although reef shell or sand where present provides substrate for a slightly more diverse assemblage.

3.6.2.2.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

This alternative involves the direct disturbance of between 36,000 to 45,000 sq. ft. (0.8 to 1.0 acres) of benthic habitat per dredge per operating day. As previously described, siltation from increases in suspended sediment could secondarily affect approximately 3 acres of surrounding water bottoms. Recolonization probably begins soon after the dredge spoil has been replaced into the dredge cut because these organisms are eurytolerant and by necessity opportunistic. Their populations are dynamic and, depending on environmental conditions (i.e. season, riverine input) shrink and expand.

Estimates of the length of time necessary for the recovery of the benthic populations in dredge cuts based on sampling have been made by numerous authors. These studies were done in Mobile Bay by Jones (1972) who concluded that re-establishment of faunal populations probably occurs within two months. Taylor (1972) also studied recovery of benthic populations and concluded that these populations recovered quickly, sometimes after only six months. In some cases, however, diversity was greater in dredged sites even though numbers were approximately equal. The USACE, Mobile District studied recovery of benthos in Mobile Bay. Benthos returned to original levels in two months to two years although diversity may not fully recover in that time.

Hoeze (1974) studied 12 year old dredge cuts in Four League Bay, Louisiana, and concluded that these cuts were virtually identical to the fauna in adjacent undredged mud bottoms. GSRI (1977) whose sampling included undredged, recently dredged and old (as much as 40 yr.) cuts concluded that differences in the abundance or distribution of aquatic biota, if they existed, were masked by seasonal fluctuations.

The impacts of this alternative to benthos abundance are, therefore, temporary and may last anywhere from several months to several years. Impacts to diversity may persist for a longer period of time. Impacts of the localized turbidity created by dredging are negligible in a highly turbid system characteristic of the project area. The fluid mud flow which results from dredging is controlled by gravity and therefore its flow would be primarily back into the dredge cut. The remainder of the fluid mud will travel variable distances depending primarily on the slope and contours of the bottom.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

There would be no disturbance of the bottom assemblages by dredges; and, therefore, no lowering of benthic species abundance and diversity by dredges. Natural forces would still act on these assemblages and periodic flooding and low flow would alter the species composition and abundances. There would be no effects from increased turbidity levels or fluid mud created by shell dredging.

3.6.2.3. Oyster Reefs

3.6.2.3.1. Existing Conditions

Buried reefs of the American oyster Crassostrea virginica occur throughout the project area. The American oyster forms reefs where larval oysters can attach to a firm substrate. Even when the oysters die, uncovered reefs they have formed provide a substrate for a number of invertebrate species, including epifauna, and fish species.

Salinities must be at least 5.0 ppt to sustain oyster populations although adult oysters are severely stressed at salinities below 7.5 ppt. The best growth and reproduction of oysters occurs between 12 ppt and 30 ppt (Butler, 1954). However, reefs in areas where summer salinities are consistently over 15 ppt are usually decimated by predators and disease. Although no data are available on living reefs in the project area, it is possible that some live oysters may exist on uncovered reefs during years in which the salinity conditions are right.

Living reefs in the project area have been adversely impacted by freshwater and sediment input and from the Atchafalaya River. Because of resulting salinity reductions, oyster reefs were largely inactive by the 1950's. However, only reefs which have been buried by sediment overburden as well as those buried many years prior constitute the resource to be dredged.

Oyster shell reefs considered for dredging constitute only those buried beneath the bottom. Buried reefs have no intrinsic economic value in place. Buried reefs, unlike subaerial reefs, do not provide substrate for diverse fish and invertebrate species. Buried reefs, unlike subaerial reefs, have no effect on the water flow around them nor do they affect shoreline erosion. Buried reefs are, therefore, without known value unless mined for shell.

3.6.2.3.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

A previous restriction on shell dredging was no dredging within 1,000 feet of exposed (subaerial) reefs. May (1973) measured turbidity in the discharge of a hydraulic dredge in Mobile Bay and found that values at the surface did not exceed 50 JTU (Jackson Turbidity Units)

beyond 400 feet away from the discharge. GSRI (1977) profiled the turbidity around a Radcliff operated dredge and found very few samples in which elevated turbidity values were found beyond 1000 feet downcurrent of the dredge.

The restrictions placed by regulatory agencies (DNR, USACE) are indeed sufficient to protect any resource at risk. Current restrictions prohibit dredging within 1000 ft. of exposed oyster reefs. Any reefs which supported live oysters during any given year would therefore be protected from direct and secondary impacts.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

Denial of the permit would have no impact on oyster resources in the project area. Oysters in this area, when they occur, are still however at risk from high sediment loads and variable salinity regardless of whether shell dredging is conducted in the area or not.

3.6.2.4. Refuges and Wildlife Management Areas

3.6.2.4.1. Existing Conditions

The Atchafalaya Delta Wildlife Management Area is a state facility of 126,375 acres. It is located immediately adjacent to a coastal portion of the project area south of Atchafalaya Bay. Hunting of rabbits, waterfowl, rails, snipe, coot and gallinules as well as primitive camping are allowed in this area.

3.6.2.4.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

The previously issued permits contain regulations which restrict shell dredging from the vicinities of the terrestrial and shallow aquatic habitats in the project area such as shallow shoreline areas and wildlife refuges.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

There will be no impact on wildlife management areas.

3.6.2.5. Endangered and Threatened Species

3.6.2.5.1. Existing Conditions

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have been consulted regarding the occurrence of threatened and endangered species in the project area and the potential impacts of shell dredging to any of these species. Assessments of project impacts on rare and endangered species were prepared and submitted to these agencies. Correspondence and coordination with the agencies and the species assessment prepared are presented in Appendix E.

In a letter dated October 29, 1990, the USFWS concurred with the finding in the assessment that species under their jurisdiction would not be adversely affected by the project. NMFS by letter dated March 25, 1991, also determined that shell dredging would not adversely affect species under their jurisdiction.

3.7. SOCIOECONOMIC ENVIRONMENT

3.7.1. Business and Industrial Activity

3.7.1.1. Existing Conditions

Business and industrial activity in the parishes surrounding the project area includes retail and wholesale trade, commercial fishing, trapping, waterborne commerce, marine construction, mineral exploration and production and farming. Mineral related activities include crude petroleum, natural gas, natural gas liquids, sulfur, salt, and oyster shells. Business activity in all of southern Louisiana has been in a depressed economic condition since 1984. The downturn of the oil and gas industry in the early 1980's has had severe economic impact in the area with limited prospectus for recovery within the near future. In a five year period between 1985 to 1990, business suffered employment cutbacks, layoffs, business closings, foreclosures, bankruptcies, and state and local budget problems.

Economic activity in the immediate vicinity of the shell production zones includes oil and gas production and the commercial harvest of fish and shellfish. Morgan City - Berwick, Louisiana in St. Mary Parish is one of the nation's most active commercial fishing ports, with 1989 landings totaling 68.1 million pounds with an exvessel value of \$17.8 million. Delcambre, Louisiana, in Iberia and Vermilion Parishes, had landings of 11.3 million pounds valued at \$15.7 million. The value of landings at these two ports represented more than 12 percent of the value of total Louisiana landings as reported by the National Marine Fisheries Service.

Landings of commercial finfish (excluding Menhaden) obtained from National Marine Fisheries Service in the surrounding parishes in 1989 and 1990 in millions of pounds and the values in millions of dollars are as follows:

Parish	1989		1990	
	Landings	(Value)	Landings	(Value)
	Million lbs.	(Million \$)	Million lbs.	(Million \$)
Cameron	.7	(\$1.1)	2.5	(\$2.2)
Iberia	.8	(\$1.9)	.6	(\$1.4)
Lafourche	12.1	(\$14.5)	11.2	(\$10.3)
Vermilion	4.9	(\$3.9)	2.3	(\$.9)

Shrimp catch in millions of pounds and its value in millions of dollars is given below for the surrounding parishes for 1989 and 1990.

Parish	1989		1990	
	Landings	(Value)	Landings	(Value)
	Million lbs.	(Million \$)	Million lbs.	(Million \$)
Cameron	2.7	(\$5.4)	3.9	(\$7.9)
Iberia	2.7	(\$6.7)	3.3	(\$7.7)
Lafourche	7.9	(\$18.9)	8.5	(\$18.9)
Vermilion	4.5	(\$12.1)	5.9	(\$15.4)

With regard to the shell dredging industry, the most detailed information available is that reported by the Louisiana Wildlife and Fisheries Commission and the Louisiana Department of Wildlife and Fisheries. Regulation of shell production in Louisiana began in 1913 and 1914, in part to finance the Wildlife and Fisheries Commission. Records of annual production date back to 1916, increasing from 300,000 cubic yards to 1.5 MCY by 1925, and 5,200,000 cubic yards by the mid-1960's.

A shell utilization analysis furnished by the Louisiana Shell Producers Association estimates that from 1980 to 1985 about 80 percent of all shell harvested in Louisiana was used for general construction and maintenance (roadway base course, parking lots, roads, petroleum drill pads, and levees); 10 percent for acid neutralization, smoke stack emission control, chemicals, and pharmaceuticals; about 5 percent for lime production; and another 5 percent for oyster reef cultch.

Total shell production in Louisiana continued to increase until the 1970s. Shell values in the 1960s were influenced by such things as transportation costs, construction trends, oil and gas production, resource availability, changes in material specifications, environmental concerns, governmental regulation, and an apparent shake-out in the industry encouraging greater diversification of individual companies (Arndt, 1976).

Table 4 shows recent trends in the volumes of reef shell harvested by Dravo from the central Louisiana coast. Also, Table 4 shows the amount of royalties and severance taxes paid from 1975 through 1991. Production in Louisiana has followed the same pattern of decline experienced in Texas and other gulf states which are not currently producing shell. Table 4 shows that from 1975 to 1991 buried oyster shell production declined from 3.2 MCY to 1.6 MCY. Shell production in 1991 was interrupted for 8 months because of a lease change. Also, 1992 production by the applicant and current lessee was considerably lower than in previous years (Table 4).

A 1990 - 1991 study indicated a relatively sharp increase in the price of shell, reflecting not only its importance to the local economy, but also increases in transportation costs, the rising price of fuel, increased royalties resulting from the new lease agreements and unavailability of Rangia shell. A 1990 analysis by Dr. William Barnett II, prepared for the Louisiana Shell Producers Association in conjunction with the preparation of this document, estimates the price

of shell at \$10.33/cu yd. An annual harvest of 1.6 MCY of shell, sold at that price, would be valued at \$16,528,000. The 1990 price of reef shell varies from \$10.50/cu yd. in New Orleans to \$12.50/cu yd. in Baton Rouge. The 1992 price of shells varied from \$12.00/cu yd. in the Morgan City, Louisiana area to \$14.50 per cu/yd. in the New Orleans, Louisiana area. The price of shell appears to have continued to increase as supplies decline. At the present time, Louisiana is the only state in the Gulf area harvesting shells for industrial/commercial purposes. The study indicates that increases in restrictions by regulating authorities have resulted in substantial reductions in the volume of shell harvested. This has caused the per unit operating cost to increase, which has, by necessity, been passed on to users in the form of higher prices (Barnett, 1990).

A recent comparison of the average (delivered) cost of shell and the average cost of alternative materials used in a Corps project confirm that the cost of shell has increased, making alternative materials more competitive than in the past.

A more recent (March, 1991) comparison of the cost of shell and alternative materials used by the Corps in a levee enlargement project in St. Mary Parish indicated that the prices of alternative materials have recently become much more competitive. Only one of 15 companies submitting bids for this particular project anticipated the use of shell for the surfacing feature of the project. Its estimated installed price was \$24/cu yd., with a total cost of \$72,000. One company anticipated use of sand-clay-gravel at the same price. All others anticipated the use of crushed limestone with installed prices ranging from \$21.75/ cu yd. to \$52.40/cu yd. The low bid for the project anticipated the use of crushed limestone with an installed price of \$24/cu yd., but with a total cost of this project feature of \$55,800. In this instance, the limestone option required less material per cubic yard than the sand or shell options due to its mass.

Recent price range estimates of materials delivered (as opposed to previously quoted "installed" prices) are as follows: 1) shell - \$17-\$22/cu yd.; 2) limestone - \$19-\$24/cu yd.; 3) sand-clay-gravel - \$12-\$14/cu yd.; and 4) calcium carbonate - \$14-\$17/cu yd. Many factors influence the use of a material including its immediate availability at any given time. This review, however, clearly demonstrates that shell is a highly valuable raw material. Its continued production is important not only to the shell dredging industry but also to other local businesses indirectly influenced by jobs and income dependent on the industry.

3.7.1.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Shell dredging activities tend to have an economic multiplier effect, influencing indirectly other businesses and industries. Areas of influence include total sales, resales, transportation costs, royalties and severance taxes, state and local sales taxes. With an estimated multiplier factor of three, overall economic effects resulting from an annual production of 1.6 MCY of reef shell could be on the order of \$63,900,000 (Barnett, 1990).

Issuance of the permit would authorize the Louisiana Dredging company to dredge and remove shell resources from the project area. The positive impacts of the industry on business can be seen in Zones 2-3 where shell dredging is currently conducted. This alternative also would provide for the continuing supply of oyster shells to local areas and industries requiring them. Shell surveys in the project area indicate a 5 to 8 year reserve of reef shell based on the production of 1.6 MCY per year.

The shells produced from the project area could, therefore, be used in the manufacture of cement, glass, chemicals, wallboard, chicken and cattle feed, agricultural lime, road construction, water purification, pharmaceuticals, petroleum and other chemical and miscellaneous products.

This alternative would allow dredging activities in the project area with the limitations imposed by the various state and federal regulatory authorities. The LDWF and DNR have developed a monitoring system for measuring and controlling environmental impacts which may damage commercial fisheries and other resources under their regulatory authority (Juneau, 1984).

Impacts of shell dredging on the fishery resource is anticipated to be minimal because fish and shrimp are mobile species which actively avoid excessive turbidity. All common commercial species are adapted to life in Louisiana estuaries which are seasonally turbid. The area in which turbidity is influenced by an operating dredge is also small, 2.9 acres at any one time or 4.3 acres per dredge per day. Also, bottom dwelling marine organisms quickly begin colonizing recently dredged areas.

The newly dredged areas are not perceived to be a problem to fishing gear. A discussion was held with Mr. Brandt Savoie, Shellfish Project Manager, LDWF, Marine Fisheries Division, regarding the potential for hanging nets on newly dredged cuts. Mr. Savoie has studied the problem in Lake Pontchartrain and was of the opinion that the soils in the project area would not pose as many problems as the soft sediments in Lake Pontchartrain.

As the production of shell declines, the demands for alternate sources of aggregate will tend to increase, and utilization of this source of raw material will gradually decline as it has in other states.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

This alternative makes unavailable to the shell dredging industry the large reserves of shell in the project area (portions of Zones 8 and 9). In the long term, these reserves are crucial to the industry's continued operation when the reserves in Zones 2-3 are no longer available. The cessation of shell dredging is estimated to result in a \$7 million loss of capital investment as well as the increase in the cost of shell replacement material for industrial use (Barnett, 1990). This alternative shortens the expected remaining life of the shell dredging industry by 5 to 8 years at current production rates.

3.7.2. Employment/Labor Force/Displacement of People

3.7.2.1. Existing Conditions

Louisiana in the past few years has suffered from high unemployment due to the decline in the oil industry. Tables 9 and 10 show historic employment and unemployment statistics from 1980 to 1991 for Louisiana and the parishes surrounding the project area. From 1980 to 1986, the unemployment rate in Louisiana increased from 6.8% to 13.7%, and in January 1991 it was 7.0%. The unemployment rates for January 1991, in the parishes surrounding the project area, ranged from 6.5% to 8.7%, with the highest rate of unemployment in Vermilion Parish. Table 11 presents the labor force and employment by industry. In 1990, the highest levels of employment by major industry in the project area, in order of magnitude, were trade, manufacturing, services and mining.

TABLE 9

**CIVILIAN LABOR FORCE
FOR LOUISIANA AND THE PROJECT AREA
1980 TO 1991
(THOUSANDS)**

<u>YEAR</u>	<u>LOUISIANA</u>	<u>THEBODAUX</u> <u>HOUMA IMA</u>	<u>ST. MARY</u>	<u>IBERIA</u>	<u>VERMILION</u>
1980	1,788	76.2	28.7	27.6	19.5
1981	1,855	78.9	31.2	29.6	20.4
1982	1,865	80.0	31.9	30.6	20.7
1983	1,913	79.3	30.9	29.9	21.2
1984	1,944	77.8	30.2	28.4	21.2
1985	1,987	79.4	30.7	28.8	22.2
1986	1,958	75.3	31.0	30.6	22.0
1987	1,949	73.6	25.4	26.8	20.6
1988	1,921	70.3	24.4	25.6	19.1
1989	1,900	69.5	24.25	26.25	18.6
1990	1,875	69.1	23.75	26.25	17.575
(Jan.) 1991	1,870	68.8	23.975	26.7	17.650

SOURCE: LOUISIANA DEPARTMENT OF LABOR, 1991.
Personal Communication

TABLE 10
 UNEMPLOYMENT RATE
 FOR LOUISIANA IN THE SURROUNDING AREA
 1980 TO 1991

<u>YEAR</u>	<u>LOUISIANA</u>	<u>TELBODAUX</u> <u>ROUMA IMA</u>	<u>ST. MARY</u>	<u>IBERIA</u>	<u>VERMILION</u>
1980	6.8	4.3	4.9	5.6	5.6
1981	8.4	5.4	6.0	6.0	6.5
1982	10.4	8.3	11.0	11.0	8.9
1983	11.8	14.3	17.7	17.4	14.2
1984	10.0	11.1	13.8	14.7	12.9
1985	11.5	11.5	14.6	13.9	14.3
1986	13.7	19.1	23.6	20.0	21.6
1987	12.0	15.8	22.2	19.7	18.9
1988	10.9	11.1	14.3	13.0	14.9
1989	7.9	7.5	9.7	8.2	10.0
1990	6.2	5.6	7.0	6.0	6.9
(Jan.) 1991	7.0	6.5	7.7	7.2	8.7

SOURCE: LOUISIANA DEPARTMENT OF LABOR, 1991.
 Personal Communication.

TABLE 11
LABOR FORCE AND EMPLOYMENT BY INDUSTRY
1990

	<u>IBERIA</u>	<u>ST. MARY</u>	<u>TERREBONNE</u>	<u>VERMILION</u>
LABOR FORCE	26,250	23,750	37,400*	17,575
UNEMPLOYMENT	1,575	1,650	2,100*	1,225
% UNEMPLOYMENT	6.0	7.0	5.0*	6.9
MANUFACTURING	4,825	4,475	5,600	850
MINING	2,475	2,975	5,400	1,350
CONSTRUCTION	1,125	1,300	1,900	325
TRANS., UTILITIES	1,875	4,525	6,700	950
TRADE	5,325	4,375	14,400	2,375
FINANCE, INS. & REAL EST.	950	800	2,100	400
SERVICE & MISC.	3,550	3,725	10,700	2,200
GOVERNMENT	3,750	3,375	10,800	2,900

*Preliminary

SOURCE: Louisiana Department of Labor, 1991
Personal Communication

The economy of the state and the project area have been severely depressed for several years due to the downturn in the petroleum industry. The state and the parishes surrounding the project area have also been adversely affected by the problems in the financial industry due to the Savings and Loan crisis. The result has been very poor economic conditions and growth with no adequate growth in the near future (Barnett, 1990).

In 1993, the shell dredging industry in Louisiana directly employed 105 personnel in the Central Gulf Coast operations in Zones 2-3. These personnel worked in excess of 300,000 annualized manhours. These same personnel would be involved with the proposed project.

Industry economists have estimated the number of jobs and man hours which are indirectly involved in the support activities of harvesting and supplying of oyster reef shells (including service, supply and transport activities) using a multiplier of three (3). For 1993, it is conservatively estimated that 315 personnel, worked a total of 661,500 manhours (i.e. 2100 hours per year) as indirectly involved in shell dredging activities (Barnett, 1990).

Unemployment is a major determinant in the migration of workers in a population. The fewer the jobs available, the more skilled and unskilled workers move away from an area to seek employment elsewhere. This is one factor among many which reduced the unemployment percentage in the state from the high of 13.7% in 1986 to 7.0% in January 1991. Workers unable to acquire employment simply moved to where jobs were more available.

3.7.2.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

This alternative would provide shell resource to keep companies active 5 to 8 years beyond the resource life in Zones 2-3. Extending the life of the industry will extend the employment of those dependent on the shell dredging industry. This alternative would provide direct employment for about 105 people for an additional 5 to 8 years in the industry. Based on 1990 labor hours and rates, each year of production would produce about 300,000 direct manhours and \$4.4 million in direct wages and benefits and about 661,500 indirect manhours for 315 workers and about \$10.3 million of indirect wages and benefits in the regional and state economy (Barnett, 1990). The annual income generated both directly and indirectly is \$14.7 million. Using an economic multiplier of 3, the annual income results in a \$44 million total impact on the local, regional and state economies.

There would be no displacement of people over the next several years if shell dredging is continued.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

This alternative limits the influence of the shell dredging industry on local and state economic growth to the remaining life of operations in Zones 2 and 3. This alternative eliminates the future growth of one industrial sector and its resultant impact on the overall economic growth (recovery) of the region and state.

This alternative would result in the loss of 105 direct and 315 indirect jobs in the local economy, and shorten the industry life in the area by 5 to 8 years. Assuming a switch to alternative aggregate sources with some retained employment but with the total loss of production jobs and the related support activities, it is estimated by Barnett (1990) that there will be a net loss of 289 jobs and over 673,000 annual manhours of work. The lost income from the labor hours (Barnett, 1990) would be over \$9 million in wages and benefits at a conservative rate of \$13.40 per manhour. There would also be a loss of the responding multiplier which is estimated to be 3 times the \$9 million in lost wages or about \$27 million in total lost income (Barnett, 1990).

A one time cost of about \$1.36 million would be incurred due to the loss of 289 jobs and the payment of unemployment benefits of \$181 per week for 26 weeks for each lost job assuming no one finds other employment (Barnett, 1990). It is likely that displaced production workers would relocate to other states to find employment created in the alternative aggregate industry. Also, with the loss of 289 jobs, it is estimated that over 1100 people in the project area would be impacted. This estimate assumes about four people per household. The displaced workers would have to find jobs in the local area which would be difficult in the depressed economy or relocate to another area to find work.

3.7.3. Property Values

3.7.3.1. Existing Conditions

Real property values in the project area have been falling in recent years due to the depressed condition of the state and local economies. Residential housing values have decreased due to depressed economic conditions in general and the depressed oil and gas industry in particular. These conditions have caused unemployment and the migration of workers from the project area. With fewer workers, there is less demand for housing and as additional housing has been placed on the market, property values have been further reduced. On May 4, 1987, the Louisiana Tax Commission ordered all parish tax assessors throughout the state to reappraise property two years ahead of schedule. One reason given for the order was the poor condition of the economy in Louisiana which has led to a decline of property values.

Shell dredging companies currently operating in Louisiana have an investment of approximately \$60 million in dredges, boats, motor vessels, barges, cranes, and other equipment. Of this total, approximately \$18.3 million, is currently in use in Zones 2-3. Shell industry officials estimate a salvage value of nearly \$770,000 in capital equipment currently in use.

3.7.3.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

This alternative would help to sustain current residential property values in the area by not requiring workers to seek employment and housing elsewhere for an additional 5 to 8 years. During this period property values may have a chance to stabilize, similar to recent employment conditions.

Capital equipment owned by the dredging companies would retain its value which is estimated to be \$8 million.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

The value of capital equipment owned by the industry would be reduced to salvage value as soon as dredging ceases in Zones 2-3. Equipment used in shell dredging cannot be economically used or converted to use in dredging sand in the Atchafalaya River according to estimates made by the former lessee. Shell industry officials estimate that salvage value of equipment is about \$770,000 of their original investment. There would be a loss of approximately \$7 million in the value of shell dredging capital equipment.

3.7.4. Public Facilities, Services and Transportation

3.7.4.1. Existing Conditions

The major support center for the shell dredging industry is Calumet, located 12 miles west of Morgan City. Much shell is transported on barges to other localities on the Gulf Coast. This creates jobs for marine transportation companies, marine repair facilities, support activities and distribution facilities at the various localities. Also, there is some marine traffic associated with the transport of materials, workers, supplies and services between the shore and the dredging sites.

Public facilities and services influencing, or influenced by, shell dredging are primarily roads, streets, municipal water, drainage and sewer utilities, channels, bridges, docking facilities, and related activities of municipal, state, and Federal regulating authorities.

Over 80 percent of total shell usage during the 1980-1985 period was for general construction and maintenance (roadway base course, parking lots, roads, municipal pipeline utilities, drill pads, and levees) (Douglass, 1986). Assuming a past annual production of about 3 MCY of shell from the project area, approximately 2.4 MCY were used for these construction related purposes. The majority of this usage was for public construction and maintenance of highways and roadways. In the past, shell cost and functional characteristics have outperformed competing materials for these tasks. Recently the rising cost of shell has made alternative materials more competitive (as discussed in Subsection 3.7.1.1.). The continued use of shell, nevertheless, could help control the cost of maintaining public facilities as long as the material is available.

In south Louisiana there is a shortage of desirable aggregates for use in highway and public works construction. The nearest limestone quarries are located in Alabama, but most of the limestone now used in Louisiana comes from Missouri and Kentucky where it can be shipped by less expensive water transportation (Douglass, 1986). As discussed in Section 3.7.1., Business and Industry, the increasing cost of shell reflects its importance as material frequently used in construction of roads, levees, and other public facilities.

The Louisiana Department of Transportation and Development (DOTD) uses shell in transportation projects as a base course material, in asphaltic concrete, as a shoulder material, and as an embankment in marsh and swamp areas. Shell products, such as lime and portland cement, are also used. The department's evaluation indicates that shell has engineering properties that make it an extremely useful building material. Because of its shape, it provides high particle interlock, which results in high shear strength (resistance to movement). This quality makes shell a superior material for bridging over soft sub bases, such as marsh or swamp soils.

According to a study prepared by the Louisiana DOTD geologists several years ago, shell aggregates produce a base course equal to that of crushed stone in load-carrying capacity. The study indicated that crushed limestone has to be shipped in large quantities for use in base course construction, while the use of shell would result in considerable savings to the public. The analysis indicated that in parts of the state where shell was available, use of a cement-stabilized shell base course resulted in additional strength thereby requiring less material.

The Louisiana DOTD, in cooperation with Louisiana State University, conducted research on utilizing shell to build "Floating Embankments" through marsh and swamp for the relocation of U.S. Highway 90 west of Raceland, Louisiana. Based on this research, they concluded that it would require only half as much shell, compared to sand, to construct an embankment in this wetland environment. In addition, the required right-of-way for a shell embankment was considered approximately 50 percent less than for a sand embankment. The reason for less right-of-way for shell, compared to sand, and for less quantity of shell, is because the shell embankment requires no berms for stability, as does the sand. This smaller right-of-way requirement also lessens the environmental impacts of the project. While this example reflects only one use of shell, it illustrates how shell has been important in constructing and maintaining public facilities in southern Louisiana.

Limestone was used in over three miles of roadway construction in U.S. Hwy. 90. Approximately 438,670 cu yds. were used in this area and it was barged from St. Genevieve, Missouri.

3.7.4.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Issuance of the permit would allow production of shell beyond those resources in Zones 2-3 which, in turn, would provide a relatively low cost and desirable aggregate for use in construction and maintenance of highways, roads, levees, public utilities, and other projects. Public services would continue to be enhanced through collection of royalties and severance taxes. Revenue generated by shell dredging operations will continue as long as the resource can be economically produced. Some tax revenues would likely be used to monitor and control adverse impacts.

The level of commercial marine transportation associated with ongoing dredging activities should remain unchanged. The marine vessel traffic associated with shell dredging would continue; however, as the producible reserves decline, material transport and service trips would decline, and alternative materials would be required for continued maintenance.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

Permit denial would impact highway, roadway, airport, and other public works construction projects in southern Louisiana as existing resources of shell are exhausted by ongoing projects. During the period 1980-1985, over 80 percent of total shell usage was for general construction and maintenance (roadway base course, parking lots, roads, municipal pipeline utilities, drill pads and levees) (Douglass, 1986). Other materials used as coarse aggregates, which may have higher transportation costs, would have to be delivered from other states.

Some of the engineering properties that make shell a useful building material, such as high particle interlock, are not found in other construction aggregates. In a marsh and swamp area, as in parts of southern Louisiana, twice as much sand is required to construct an embankment than when shell is used. The use of sand is more time consuming since mucking out and backfilling are required. In addition, the required right-of-way for a shell embankment is approximately 50% less than for a sand embankment. All of these factors amount to added expenses to the taxpayers if shells are not available for use in public construction projects.

Public services and the quality of life in the project area also will suffer from the loss of royalties and severance taxes collected by state government. Increased outlays for unemployment payments and other social relief services for those employees losing their jobs would further add to local government budgetary problems and reduce the availability of some services to the overall populations.

There is no anticipated significant change in marine transportation with the demise of shell dredging activities. Commercial marine traffic and traffic associated with local commercial fishing fleets would remain unchanged. The marine traffic between the shore and the dredge sites would be eliminated. The problems associated with navigational and operational errors in the vicinity of dredging would be eliminated although vessel to vessel collisions or vessel to dredge collisions have been relatively few.

3.7.5. Tax Revenues

3.7.5.1 Existing Conditions

An important economic contribution of the shell dredging industry to the State of Louisiana is the millions of dollars paid through the years in royalty and severance taxes. As the value of shell has increased, tax revenues associated with its production have increased. Royalty rates for oyster shells have increased from 12 to 20.5 cents/cu yd. in 1975 to 90.1 cents/cu yd. in 1989. In 1991, reef shell (oyster shell) production royalties paid by the industry to the State of Louisiana totaled \$1,602,574. Table 4 shows oyster shell production volumes and royalties paid by Dravo from 1975 through 1991. Volumes of shell dredged and royalties paid are also given for 1992 in Table 4, although both are much lower than previous years because of the interruption of the industry.

In addition to the royalties collected in conjunction with regulation of the shell industry, the state collects severance taxes of \$.06/ton. Severance taxes paid by Dravo for reef shell harvested during the years 1975 through 1991 and those paid by Louisiana Dredging in 1992 are also given in Table 4.

Additional tax revenues are created indirectly by the shell industry. Employment and income created by the industry generates federal and state income taxes and state and local sales taxes.

In the parishes surrounding the project area, tax revenues are generated by assessed property taxes and from sales taxes. For 1985, the Louisiana Tax Commission (LTC) reports the following tax revenues for the project area (LTC, 1986; LOCI, 1986).

<u>PARISH</u>	<u>TOTAL PARISH & LOCAL TAXES</u>	<u>STATE SALES TAXES</u>
Iberia	\$10,765,427	\$10,303,935
St. Mary	17,205,597	9,920,295
Terrebonne	31,015,359	15,212,636
Vermilion	12,498,966	4,105,582
TOTAL	\$71,485,349	\$39,542,448

3.7.5.2 Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Implementation of this alternative would allow dredging and production of oyster shell in portions of Zones 8 and 9 and thereby continue the revenue stream of royalties and severance taxes to the State of Louisiana. Table 4 shows that shell production over the last ten years has shown a downward trend and this trend could be expected to continue. Nevertheless, due to increases in royalty rates, royalties paid to the state for oyster shells were much greater in 1989 and 1991 and 1992 than in 1975. Thus, continued availability and production would provide much needed revenue to the state.

As discussed in the analysis prepared by Barnett (1990), a production rate of 1.6 MCY per year is estimated to produce over \$1.48 million in royalties and severance taxes annually to the state plus approximately \$1.82 million in additional state and local sales taxes per year. The total direct value of the production of 1.6 MCY per year is estimated to be \$21.3 million. This amount and its economic multiple would not be lost to the region and state economies each year for additional years if this alternative is implemented. Any increase in the price of shell could result in a corresponding increase in tax revenues indirectly from the higher value of the product.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

This no action alternative would reduce public tax revenues. The loss of royalties and taxes by state and local governments would add to governmental budgetary problems. Business and corporate income tax, as well as personal income taxes, also would be lost to the Federal government and the State of Louisiana.

A production rate of 1.6 MCY per year is estimated to produce over \$1.48 million in royalties and severance taxes annually to the state plus approximately \$1.82 million in additional state and local sales taxes per year. This amount and its economic multiple would be lost to the region and state economies each year for additional years if this alternative is implemented (Barnett, 1990).

Royalties paid on coarse aggregates (limestone) mined out-of-state range from 9 to 45 cents per cubic yard. Out-of-state royalties are paid only to the land and property owners. State and local governmental units would not receive any financial benefit unless the quarry site is publicly owned. Taxes generated in the production of alternative aggregate materials outside of Louisiana would contribute only to the tax base of the political body where the production site is located and where the product is quarried.

Additionally, loss of employment and income created by the industry means loss of income taxes and sale taxes to the State and local parishes.

3.8. SOCIAL ENVIRONMENT

3.8.1. Aesthetic Values

3.8.1.1. Existing Conditions

The natural beauty and aesthetic values of the area resides in large expanses of open water. These expanses are broken by oil wells, production platforms and marine traffic. The water is usually turbid. There is a tremendous amount of natural suspended sediment which is derived from the high fresh water inflow of the Atchafalaya River and Wax Lake Outlet.

3.8.1.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

There would be minimal impact on area aesthetics from this alternative. Shell dredges are aesthetically indistinguishable from marine traffic or oil industry facilities and the turbidity plume created by the dredges is very localized. As there will be no dredging near any existing shoreline, the increased turbidity would be noticed only by those on a dredge or in a nearby boat.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

No adverse impacts from shell dredging, however minimal, would occur. Eliminating dredging-related activities as a source of turbidity would have little impact, if any, on the aesthetic value of the already turbid area waters.

3.8.2. Archeology/Cultural Resources

3.8.2.1. Existing Conditions

The Louisiana coastal waters have been traversed by historic watercraft since the earliest colonization of the region. It's also possible that prehistoric vessels utilized these waters. At present there are 42 recorded wrecks in the coastal waters of Louisiana. In addition to these resources, there are 7 recorded wrecks in Atchafalaya Bay and 1 wreck (the 1841 sinking of the Chancellor) reported specifically from Point Au Fer Island (Pearson *et al.*, 1989). Nautical charts prepared by NOAA (chart 11351 Point au Fer to Marsh Island) reveal one partially submerged wreck within the proposed permit area and an additional 10 wrecks within a 10 mile zone around the permit area. However, the number of recorded shipwrecks may only represent a

small number of sunken wrecks that may actually exist in the permit area. The amount of historic ship traffic which passed through the permit area indicates that there is a high potential for historical shipwrecks.

The permit area, as part of the Louisiana coastal waters, has the potential to contain colonial period (ca. 1718-1803) shipwrecks. The 1979 discovery of El Nuevo Constante, a Spanish sailing vessel lost in 1766 in similar waters off the coast of Cameron Parish, amply illustrates the potential. The probability for shipwrecks in the permit area increases for nineteenth and twentieth century vessels due to its function as the Gulf access route for the port of Morgan City, Bayou Teche and the Atchafalaya Basin. All of these were important navigation routes during the nineteenth century.

Navigation through the permit area and the adjoining Atchafalaya Bay was treacherous due to the shallow water depths and the numerous shoals and shell reefs. "Morgan's Channel" was a privately built navigation channel excavated in 1870-1874. This project was 12 feet deep and 100 feet wide and was located west of the present channel. The present channel was originally excavated to a 12 foot depth with a 100 foot width in 1907. It was later enlarged to its present dimensions. The locations of these navigation corridors should be considered particularly sensitive.

Several types of shipwrecks may exist in the permit area. The earliest vessels would be wooden sailing ships of the eighteenth century. Such vessels include galleons, brigs, sloops, frigates, etc. Later vessels are expected to be more numerous and would include steamships, luggers, schooners, trawlers, tugboats and barges. Modern wreckage and debris is also expected to exist in the permit area.

The adjoining federal waters are also considered high probability areas for historic shipwrecks by the U.S. Minerals Management Service (MMS, 1990). This assessment is based on updated baseline studies completed in 1990. MMS requires historic shipwreck surveys for all lease applications in high probability areas.

Water and geomorphic conditions in the permit area are conducive to the preservation of shipwrecks. The high rate of sedimentation in this area increases the likelihood that historic wreck sites were covered by silts and clay deposits. Archeological investigation of shipwrecks in Louisiana's coastal waters reveals that site burial is a significant factor in preserving shipwrecks. In such conditions, wooden timbers and otherwise perishable materials are often well preserved.

There is also the potential for inundated prehistoric archeological sites in the permit area. The likelihood of intact terrestrial sites is considered minimal since the process of inundation involved erosion of former land surfaces along the coast.

3.8.2.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

At present there are no known cultural resources eligible for listing or listed on the National Register of Historic Places in the permit area. However, the proposed permit area is a high probability zone for historic shipwrecks and, therefore, shell dredging has the potential for adverse impacts to these resources. In order to address this potential, a multi-phased shipwreck identification and avoidance program should be implemented as a permit condition. The first phase should involve historical study to determine which portions of the permit area have the greatest potential for wreck locations.

Identification surveys should be performed in advance of shell dredging activities. These magnetometer surveys, which should be performed by an independent surveyor and submitted to the LDNR and the LDWF, should record the presence of any and all submerged objects, including shipwrecks, pipelines, discarded oilfield equipment and reefs exposed above the mud line.

Any significant historic shipwrecks located by these surveys should be avoided, when possible, during dredging operations. If avoidance of dredging impacts is not possible, mitigation plans will be developed and implemented in consultation between the applicant, the New Orleans District, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

In addition, any Department of the Army permits, if issued, should contain specific conditions requiring the permittee to survey for and report to New Orleans District if any previously unknown historical or archeological remains are discovered during shell dredging activities. All dredging in that area should then cease until clearance to proceed is provided by the Corps pursuant to consultation with the Louisiana State Historic Preservation Officer.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

If the permit is denied, there would be no possibility of shell dredging impacts to historic shipwrecks that may occur within the project area.

3.8.3. Desirable Regional and Community Growth

3.8.3.1. Existing Conditions

Desirable community growth in the project area is linked to a variety of interdependent socio-economic and quality of life factors including such things as the availability of a stable source of employment and income; adequate utilities; the maintenance of streets and sanitation; police, fire, and flood protection; health care; and the quality of education. Growth and the quality of life for many residents in the project area have been strained in recent years and currently remain under stress due to the poor economic conditions resulting from the decline of the oil industry.

The shell dredging industry provides continued employment and income, both direct and indirect, to residents in the project area. Taxes and royalties paid by the industry help finance certain services and infrastructure maintenance by state, parish and local governments. Oyster shells are an inexpensive high quality construction material when compared to alternative materials. Because of its relative price, use of the shell during construction has helped to sustain the economic growth of both the project area and the area where it is used.

3.8.3.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Community growth is affected by a variety of interdependent social and economic factors, including stable sources of employment and income; adequate public utilities; the maintenance of streets and sanitation; police, fire, and flood protection; good health care; and quality education. Issuance of the permits would result in the continued employment and income generated both directly and indirectly by the industry, thereby encouraging community and regional growth.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

If the permit is denied and shell dredging is not allowed in this area, the higher cost of alternative materials would discourage growth, particularly in communities experiencing the adverse economic effects from the decline of the oil industry.

Additionally, local communities would experience the loss of jobs and tax base upon which municipal services depend.

3.8.4. Community Cohesion

3.8.4.1. Existing Conditions

The social harmony and cohesion of communities in the project area depend on a wide range of factors including the physical environment, employment and income opportunities, the availability of public facilities and social services, and the cultural history which many community residents have in common. Two of the most significant factors influencing community cohesion in any area are stable employment and income.

Shell dredging has resulted in controversy, requiring the current level of regulation by state agencies. In years past, conflicts arose between the interests of the shell dredgers and commercial fishermen. More recently, questions have been raised by environmental groups regarding potential adverse impacts to wetland resources. Conflicts have been resolved through normal legal processes. The most recent dispute has resulted in an agreement to eliminate dredging from Four League Bay and limit any new permit applications to the coastal waters of the GOM.

3.8.4.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

The employment of people and income generated both directly and indirectly from the shell dredging industry would contribute to positive community cohesion throughout the project area. Government services would benefit from royalties, and severance taxes collected from dredging companies, as well as from sales taxes and income taxes from individuals, businesses and corporations employed in dredging.

The history of shell dredging suggests that no matter what mitigating efforts are made by the applicant, (e.g. the compromise position taken by Louisiana Dredging Company), the emotionally charged nature of the issue of shell dredging may result in some interested groups remaining unsatisfied. As in years past, final resolution would be found through the cooperation of interested parties and local, state and federal governments.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

The impact of this alternative would include disruption of social harmony and community cohesion resulting from the loss of jobs and income to at least 122 individuals directly employed and those indirectly employed, once shell resources in Zones 2-3 have been harvested. This effect and impact would be particularly severe in the local areas, which are currently attempting to recover from the effects of the declining oil industry.

Discontinuation of shell dredging would eliminate the environmental concerns of the opponents of shell dredging but not necessarily eliminate the controversy over the issue of whether or not these valuable resources should be harvested.

3.8.5. Noise

3.8.5.1. Existing Conditions

In the project area, the only notable noise levels are those associated with shell dredging or energy exploration and production. A casual passing boat would also create noise in excess of natural background levels. In a recent unpublished study, noise level on an operating dredge ranged from 60 decibels to 100 decibels. Figure 12 is presented to relate the sound levels to various activities. Noise levels greater than 80 decibels for prolonged periods of time are considered injurious to health and may impair hearing.

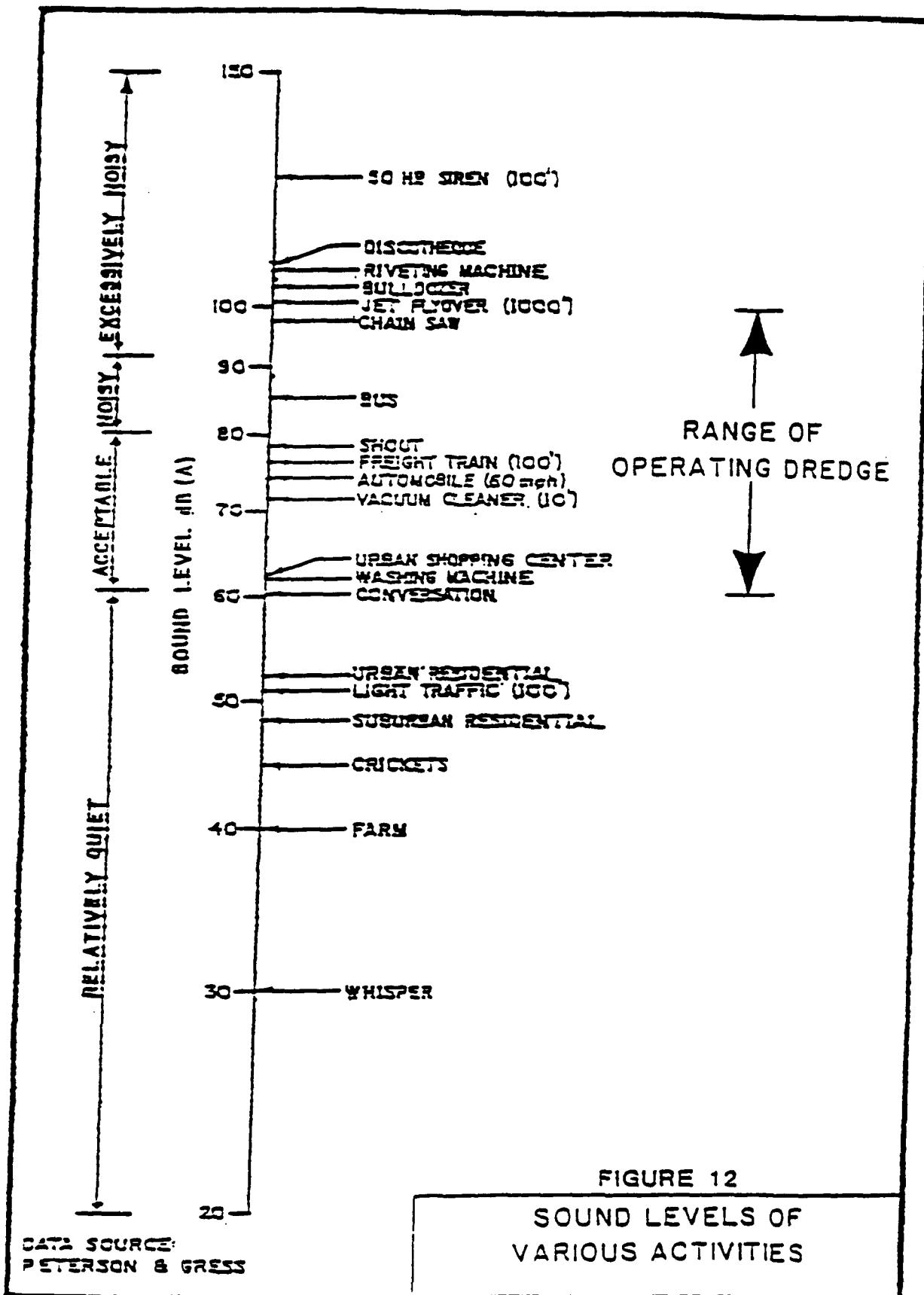
3.8.5.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

The adverse noise levels on and near operating dredges affect only those people on or nearby to dredging activities, primarily those employed by the industry. The applicant's operations are required to meet standards set by the Department of Safety and Health Administration. As long as these standards are met, impacts should remain within acceptable limits.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

No noise levels due to operating dredges and associated vessels would occur.



3.8.6. Recreation

3.8.6.1. Existing Conditions

The nature of the project area and its relative lack of road access primarily restrict the types of recreational activities to those associated with boats or boating. The most common activities are salt water fishing, shrimping and boating. The less common recreational activities that occur in or immediately adjacent to the project area are hunting, swimming, primitive camping and wildlife related recreation such as bird watching. Portions of the area are used as recreational fishing and shrimping grounds. This is particularly true during the spring and summer.

Fishing and shrimping are the most significant recreational activities in the project area. In the 1986 license year, 40,614 saltwater recreational fishing licenses were issued in the surrounding parishes of Vermilion, Iberia, St. Mary and Terrebonne, with the latter parish having approximately 51% of the total. Likewise, a total of 3,471 recreational shrimping licenses were issued in 1986-87 in these parishes, with Terrebonne Parish accounting for 41% of the total. Recreational boat registration for 1987 in these parishes totaled 33,263 with Terrebonne Parish accounting for 42% of the total.

The large numbers of boats and licenses does provide an indication of the potential magnitude of recreational activity in the project area; however, several factors should be considered in evaluating the significance of these figures. Due to long boat travel times from boat launches to the project area and its exposed nature, these areas are likely to receive a substantially smaller portion of the recreational activity than inshore waters. Approximately 40-50% of the total boat registration and licenses are from Terrebonne Parish and the parish

population centers are relatively remote from much of the project area. Terrebonne Parish has large bays and expanses of marsh outside of the project area and closer to much of its population. It is likely that boats and fisherman registered in parishes other than Iberia, St. Mary and Terrebonne will also use the project area, increasing the recreational usage.

3.8.6.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative - Dredging in Portions of Zones 8 and 9

Issuance of the permits would have no effect on the state parks, wildlife refuges and beach areas. These areas are protected from dredging by previously existing federal and state permit restrictions. Shell dredging would have no significant impact on the recreational use of the area.

ALTERNATIVE 2 No Action - No Dredging in Portions of Zones 8 and 9

Denial of permits would have no effect on recreation in the area.

4. CUMULATIVE IMPACTS

4.1. INTRODUCTION

No activities in the coastal waters occur in a vacuum, insulated from other natural or human endeavors. Shell dredging will share the near shore ecosystem with other activities such as marine transportation, oil and gas exploration and production and commercial and recreational fishing. Additionally, other activities occurring outside the project area can impact this ecosystem through changes in hydrology and water quality in tributaries leading into the area.

To adequately assess the significance of shell dredging impacts, these other activities that alter, modify or affect the natural processes of the project must be considered. The following sections describe some of these activities that also affect the project area.

4.2. SEWAGE

Sewage introduced into the bays that extend for miles northerly from the project area comes from municipal and industrial wastewaters discharged into the bayous, streams and rivers which flow south into the Atchafalaya and East Cote Blanche Bay. Septic drainage from unsewered communities have also added to water quality problems. The inshore coastal water nearest the source of the wastewater discharges are most affected by sewage discharges. Although introduced material eventually enters the near shore GOM environment, the project area is not appreciably affected.

4.3. URBAN AND AGRICULTURAL RUNOFF

Urban and agricultural runoff impact the quality of the bayous, streams and rivers more severely than the quality of the nearshore GOM waters of the project area. The large urban center which drains immediately north of the project area is Morgan City. The mouth of the Vermilion River is ??? miles northwesterly from the GOM waters of the project area. The Vermilion River drains some 24,461 acres of crop and pastureland (Water Resources Engineers, 1980). North of the project area, approximately 152,461 acres of crop and pastureland are located in the Atchafalaya River Basin which drains runoff into the Atchafalaya Bay (Sellers, Dubroc and Associates, Inc., 1980). To the east, some 27,923 acres of crop and pastureland drain into the bayous, streams and lakes which eventually enter the bays and the near shore Gulf waters (URS Company, 1980).

Heavy rains increase the occurrences of raw sewage bypasses, and also increase the distance which poor quality runoff is transported. Therefore, those areas which are not normally impacted by municipal and industrial discharges, and at times, by urban and agricultural runoff, are more likely to be adversely impacted during severe rainstorms.

Unlike sewage discharges, urban and agricultural runoff are periodic rather than continuous. Agricultural runoff is characterized by soil or sediment transporting chemical pollutants, such as nitrogen and phosphorus used as commercial fertilizers as well as some pesticides. Runoff from agricultural lands also conveys, in solution, herbicides, fungicides and insecticides used on crops. Feedlots are a source of high bacteria densities in stormwater runoff.

Urban runoff is characterized by inert materials, such as trace metals, glass, rubber and other debris. Usually nitrogen, phosphorus and pesticides are minor components in urban runoff. The organic components normally consist of leaves, grass, road oil and grease and petroleum hydrocarbons.

4.4. IMPACTS OF SHRIMPING

Shrimp trawling activities have and will continue to affect the water quality, bottom habitat and species composition in trawled areas. Shrimping typically involves disturbing bottom sediments as weighted mesh net is dragged over the sea bottom to collect benthic and epibenthic organisms. The size of the mouth of the net used by recreational fishermen will normally vary from 16 feet to 50 feet, and those used by commercial shrimpers may be up to 150 feet. Weighted wooden doors (boards) are used to hold the mouth of the net open and keep the net in contact with the sea bottom. Doors dig into the bottom as the trawl is dragged across the bottom. The effectiveness of the trawl to collect organisms depends on several factors such as time of year, water quality, sea conditions and bottom substrate and trawl design.

Shrimp trawling does cause a disturbance of the bottom. The amount of turbidity generated is largely dependent on the type of bottom substrate present and the design of the trawl. A turbidity plume is often evident in the wake of a trawl, particularly a large commercial trawl.

The shrimp trawl captures many species of fish and invertebrates, including shrimp, croaker, flounder, seatrout, sea catfish, redfish, menhaden and blue crabs. Desirable species of adult size (flounder, seatrout, redfish and blue crab) that are caught are usually kept with the shrimp. Bycatch fish, which include undesirable species and juveniles, are tossed back into the water. The discarding of waste species does not totally waste the resource in that the biomass is returned to the system.

Shrimping pressure intensifies during the spring and summer months. The pressure will continue as long as sufficient numbers of shrimp are caught, but will decrease as shrimp populations in coastal waters are reduced. Shrimping along the waters of the coast is carried out by both recreational and commercial fishermen during the spring, summer and fall.

In summary, shrimping causes turbidity impacts similar to shell dredging, however, they are seasonal and shrimping is more widespread. Although the bottom disturbance at a point is more intense with shell dredging, shrimp trawling disturbs a much wider area than does all dredging including shell dredging in these coastal areas.

4.5.

IMPACTS OF OTHER PERMITTED ACTIVITIES

The U.S. Army Corps of Engineers (USACE) and other regulatory agencies require that permits be applied for and obtained before engaging in a variety of construction activities that occur in or impact the project area. Other permitted activities in the area include oil canals, channels, pipelines, oil structures, and fill projects. All of these activities exert certain impacts on the system in which they are constructed. Corresponding impacts are often short term and localized much as are impacts from shell dredging.

4.6.

IMPACTS OF CORPS OF ENGINEERS CIVIL WORKS PROJECTS

The USACE is responsible for the construction and maintenance of many projects in and close to the project area. The environmental aspects of these actions have been considered in other EISs. Of primary significance to the USACE are the Atchafalaya River and Bayous Chene, Boeuf, and Black projects located in the coastal area of southcentral Louisiana. The purpose of the project is to enlarge existing navigation channels sufficiently to permit the passage of large offshore drilling rigs and related marine equipment between construction and repair facilities on Bayous Boeuf and Black, and drilling sites in the GOM. The navigation channel is 20 by 400 feet, starting from the vicinity of the US Highway 90 crossing over Bayou Boeuf and via several inland waterways, across Atchafalaya Bay to the 20-foot depth contour in the GOM. Material dredged from Atchafalaya Bay would be deposited in open water west and east of the channel and the material in the GOM deposited east of the channel. It is the intent to conduct disposal of dredged material in the Atchafalaya Bay to encourage marsh development whenever possible. Maintenance dredging in the gulf reach is expected to be required annually over the 50 year life of the project. Construction of the project was completed in September 1981.

The following impacts of the Chene, Boeuf, and Black project have been taken from the final Environmental Impact Statement dated March 1973 and the supplement to that Environmental Impact Statement dated November 1976. A small portion of the reef and shell deposits within the Atchafalaya Bay would temporarily be contaminated by fine-grained sediments during dredging operations. It is anticipated that disposal of dredging material would not significantly affect the overall quality of the receiving waters. The sedimentary processes and the continual build-up of the delta would not be endangered. Several hundred acres of Atchafalaya Bay bottom would be converted to ridge and fresh marsh by deposition of the dredged material.

Loss of bay bottom may result in the temporary loss of nursery ground for fishery species. Oyster and other benthic organisms in the vicinity would be covered with sediment carried from construction and maintenance activities. Temporary turbidity increases would not be sufficient to violate established water quality standards. Increased turbidity would have a minor adverse effect on any sport and commercial fishing in the immediate area.

In October 1977, the New Orleans District Corps of Engineers published a report which documented and analyzed the results of a water quality monitoring program conducted to obtain data prior to any dredging operations in the Atchafalaya Basin Floodway System. Soil chemistry and water quality analyses were performed on native water and bottom samples in the Atchafalaya Bay to determine what effects dredging would have on water quality. The results of the study indicated that there would be no release of any of the pollutants of interest from the dredged material to the receiving water.

Because accelerated growth of the delta in Atchafalaya Bay will adversely affect navigation and flood-carrying capacities of the Atchafalaya Basin Floodway system, the USACE initiated a feasibility report/EIS that will examine delta development alternatives. However, formulation and analysis of a long-term plan for the operation of the Wax Lake Structure must be completed before work on the feasibility effort can be resumed.

Any alternative(s) considered must maximize delta formation while maintaining existing flowlines and providing for navigation. One alternative to be considered would involve the placement of dredged material on both sides of the existing navigation channel to maintain flow at a level that would insure it remains a self-scouring channel. Flows in excess of the amount needed for maintenance of the navigation channel would be forced to exit into the developing delta via existing bifurcation channels, thereby enhancing delta development. Additional alternatives to be considered in the feasibility report will be developed as part of a coordinated effort involving USACE, USFWS, LDWF, Environmental Protection Agency, and LSU Center for Wetland Resources.

Maintenance dredging in the Atchafalaya Bay averaged 4.5 million cubic yards and ranged from 1.1 to 17.8 million cubic yards per event from 1976 to 1985. In the GOM reaches it averaged 5.5 million cubic yards annually for the same period.

Flood Control Activities

The Atchafalaya Basin Floodway system, a prominent feature of the Mississippi River and Tributaries project, extends from the proximity of Old River, at the junction of the Red and Mississippi Rivers, to the GOM (USACE).

Lower Atchafalaya River and Wax Lake Outlet are the outlets for the floodway system. Wax Lake Outlet was constructed to improve the capability of the Atchafalaya Basin Floodway system to pass floodflows to the GOM.

The Atchafalaya Basin Floodway system project is the primary factor in shaping the present and future physiography of the Atchafalaya Bay. That project controls the amount of flow and sediment entering the system and where the flow and sediment can go. By controlling these two parameters, the project exerts influence on salinity and other water quality parameters, delta development, habitat development, and other environmental features of the bays.

4.7. COMPREHENSIVE OVERVIEW OF CUMULATIVE IMPACTS

The only way to eliminate the potential for cumulative impacts arising from shell dredging in the GOM, whether good or bad, significant or not, is to not issue the requested permit. Denial of the requested permit would likely have significant, adverse, cumulative social and economic impacts.

If a permit is issued, exhausting the extractable resource would likely determine when shell dredging would cease, thereby deferring the advent of adverse social and economic impacts. Additionally, the potential for cumulative impacts occurring from shell dredging arises from the interactions, repetition and/or duration of effects. For shell dredging, many otherwise short-term events are essentially repeated on a continuing basis. Thus, the intensity and location of effects and the nature of any interactions must also be considered relative to cumulative impacts should the requested permit be issued.

4.7.1. Physical-Chemical Impacts

Whether dredging occurs in the GOM floor to create or maintain navigation or oil and gas access channels/pipelines, turbidity, nutrient and dissolved oxygen fluctuations, the creation of depressions (troughs), and interference with sediment dynamics as depressions of various sizes fill-in, are unavoidable adverse, localized, physical-chemical impacts. Like all those other activities, shell dredging would also occur in a turbid, sediment rich, high energy and fairly well mixed water environment. Additionally, the shell dredgers themselves have taken voluntary steps to avoid, and existing state-imposed restrictions collectively succeed in avoiding, impacting existing channels and pipelines, accreting deltas, shorelines and wetlands. Accordingly, shell dredging, either individually or in combination with other on-going activities in the nearshore GOM, is unlikely to be the cause of significant impacts in this context.

The possible reintroduction of pollutants into the water column followed by incorporation into the food chain is another possible impact of shell dredging with cumulative implications. The potential for cumulative impacts from shell dredging is really no more than the potential from dredging activities over the years that have occurred elsewhere in the GOM without apparent significant impacts. What'smore, this potential impact is a concern only if pollutants are encountered. Notably, available test results suggest that liberation of pollutants is not a problem. Therefore, the potential for significant cumulative impacts is low.

Nonetheless, the potential for cumulative impacts from shell dredging can be generally minimized or avoided (locally) by imposing no dredging zones along shorelines, around exposed oyster reefs, near wetland areas and in and around known or suspected sources of pollution. By making the potential for cumulative local impacts low or nearly nonexistent, the cumulative effect on landscape features and/or organisms many miles away is also correspondingly low to nonexistent.

4.7.2.

Biological Impacts

Dredging to install a pipeline, the action of a violent storm, and sediment deposits from rivers all destroy benthic communities. Regardless of the depth of cut or the depth or lateral extent of the accompanying sediment deposit that may stress or also destroy benthic organisms, benthic communities exhibit the first signs of recovery in a matter of weeks. Until repopulation begins in earnest, fish and other marine organisms that eat benthic-dwelling species might not forage in the general area. Within a year or two, biologically significant differences are difficult to detect. Because, benthic communities respond the same way in areas affected by shell dredging, these would also be the most apparent, unavoidable, biological impacts of shell dredging.

Shell dredging is projected to destroy the benthic community associated with about 2,190 acres per year. But before that year is complete, recovery of the benthic community would already be apparent in some of that dredged acreage. Considering the size and dynamics of the project area and nearshore GOM and the localized and short-term effects of other on-going activities with similar short-term consequences, the potential for significantly adverse cumulative impacts befalling the benthic community from the incremental addition of shell dredging to the ongoing activities in the nearshore GOM is minimal.

There are several other unavoidable biological impacts. These include temporary, local pulses of phytoplankton in response to nutrient releases, as well as the attraction of some fish species to the vicinity of active dredges related to temporarily increased food availability. Additionally, most fish species, as well as endangered and threatened turtles, would avoid the turbid areas in and around operating shell dredges, most likely because of their behavior. These

effects persist for a few days before returning to ambient levels as the dredge moves to a different location. A longer term impact would be that some bottom-dwelling fish species may be attracted to the deeper depths associated with dredged areas. This response would persist until troughs filled-in.

4.7.3. Socio-Economic Impacts

The applicant has requested a permit that, if issued, would extend the life of an industry that directly employs about 105 individuals, is the economic basis for the employment of about 315 individuals in related jobs, and supplies a product that has multiple uses. The applicant has estimated that enough shells exist to extend the life of the industry 5 to 8 more years.

If the permit is issued, product depletion would be the most likely factor determining when shell dredging would end and when the unavoidable, adverse social and economic impacts would begin.

Denial of the requested permit would have a more immediate and possible significant impact. Denial would most likely hasten the end of shell dredging. Accordingly, denial would accelerate the onset of the loss of industry related jobs and the cascade of inevitable, unavoidable, mostly adverse social and economic consequences to dependent employees and their families. Denial would also have implications to local and state agency budgets (e.g., diminished revenues, having to spend more for substitute materials) and state services (e.g., increased unemployment claims). Denial would also diminish the time industry employees, local and state governments and other consumers of shell would have to formulate and implement plans to make up the shortfall.

5. LIST OF REVIEWERS AND PREPARERS

5.1. THE FOLLOWING PEOPLE WERE PRIMARILY RESPONSIBLE FOR PREPARING THIS ENVIRONMENTAL IMPACT STATEMENT:

Name	Discipline/Expertise	Experience	Role in Preparing EIS
Dr. Maureen M. Mullino	Ecology, Invertebrate Zoology	1973, B.S., Biological Sciences 1975, M.S., Biological Sciences 1983, Ph.D., Biology	EIS Coordinator Biotic Environment and Impact
Dr. Stephen E. Steinle	Environmental Engineer	13 years environmental consulting experience with Steinle & Associates, Inc.	
Mr. Rolland A. Mura	Environmental Engineer	1964, B.S., Civil Engineering 1965, M.S., Environmental Engineering 1969, Ph.D., Environmental Engineering	Physical Environment and Impacts
Mr. Michael F. Rayle	Ecology, Invertebrate Zoology	17 years experience in environmental consulting with Steinle & Associates, Inc. 1970, B.S., Civil Engineering 1971, M.S., Environmental Engineering	Social & Economic Environment and Impacts
		16 years environmental consulting with Steinle & Associates, Inc.	Purpose and Need and Cumulative Impacts
		14 years environmental consulting with Steinle & Associates, Inc.	

LIST OF REVIEWERS AND PREPARERS
 (continued)

THE FOLLOWING PEOPLE WERE PRIMARILY RESPONSIBLE FOR REVIEWING THIS ENVIRONMENTAL IMPACT STATEMENT:

Name	Discipline/Expertise	Experience	Role in Preparing EIS
Mr. Robert Bosenberg	Ecology/Environmental Impact Analysis	1972, B.S., General Biology 1975, M.S., Ecology	EIS Coordinator
		4 years staff biologist-USFWS 9 years Environmental Regulatory Branch NOD-COE. 1.5 years Environmental Analysis Branch NOD-COE.	
Dr. David A. Vigh	Ecology, Invertebrate Zoology/ Physiology	1979, B.A., General Biology 1981, M.S., Biochemistry 1985, Ph.D., Invertebrate Phys.	EIS Coordinator (Interdivision and with Contractor)
		5 years Environmental Regulatory Section NOD-COE*, 3 years Environmental Planning Section NOD-COE, 4 years teaching general biology, microbiology, human anatomy & Macintosh computer programs at Loyola & Tulane Universities.	
Mr. Ronnie Duke	Forestry & Wildfire Management	1972, B.S., Forestry 1974, M.S., Wildlife Management	EIS Coordinator (Operations Division)
		5.5 years Environmental Regulatory Branch NOD-COE.	
Ms. Laura J. Swillay	Environmental Sciences/ Biology	1975, B.S., Biology 1976, M.S., Environmental Science	EIS Coordinator (Operations Division)
		3 years, Environmental Specialist, U.S. Dept. of Commerce, Atlanta, Georgia; 1 year, Marine Environmental Science, U.S.C.G., Washington, D.C.; 13 years, Environmental Regulatory Section NOD-COE.	

* NOD-COE - New Orleans District, U.S. Army Corps of Engineers

LIST OF REVIEWERS AND PREPARERS
 (continued)

THE FOLLOWING PEOPLE WERE PRIMARILY RESPONSIBLE FOR REVIEWING THIS ENVIRONMENTAL IMPACT STATEMENT:

Name	Discipline/Expertise	Experience	Role in Reviewing EIS
Mr. Roger D. Swindler	Regulatory Functions/ Permitting	1971, B.S., Mechanical Engineering 16 years, civil engineer, Regulatory Functions branch, NOD-COE.	Permit Coordinator (Operations Division)
Mr. David L. Reece	Fish and Wildlife Ecology	1974, M.S., Fish & Wildlife Ecology 4 years, biologist, Florida Game and Fish Commission; 12 years, biologist, NOD-COE.	Fish and Wildlife Resources Endangered Species
Mr. Michael E. Stout	Cultural Resources Management	1980, B.A., Anthropology 1991, M.S., Urban and Regional Planning (Candidate) 13 years, Cultural Resource Mgmt., NOD-COE.	Cultural Resources Setting and Impacts
Mr. Theodore G. Hokkanen	Recreation Resource Manage- ment/Outdoor Recreation Planning	1974, B.A., Foreign Languages 5 years, Chief Park Ranger, Pennsylvania Bureau of State Parks; 4 years, Chief Resource Ranger, Corps of Engineers, Vicksburg District; 12 years, Outdoor Recreation Planning NOD-COE.	Recreation Resources
Mr. Timothy J. Cookingbill	Regional Economics	1963, B.S., Business Administration 28 years, Economics, NOD-COE.	Social and Economic Impacts
Mr. Robert D. Lacy, Jr.	Economics/Socioeconomic Assessment	1968, B.A., History 19 years, Economics, NOD-COE.	Socioeconomic Assessment

LIST OF REVIEWERS AND PREPARERS
 (continued)

THE FOLLOWING PEOPLE WERE PRIMARILY RESPONSIBLE FOR REVIEWING THIS ENVIRONMENTAL IMPACT STATEMENT:

Name	Discipline/Expertise	Experience	Role in Reviewing EIS
Mr. Marvin A. Drake	Environmental Engineering/ Water Quality, Hydrology	1964, B.C.E., Civil Engineering 1975, M.S.C.E., Civil Engineering	Water Quality
Mr. Walter F. Teckemeyer	Civil Engineering	11 years, Hydrology and Hydraulic Engineering; 6 years, Environmental Engineering, NOD-COE.	Overall Content for clarity and completeness
Mr. Ricardo R. Vasquez	Civil/Cost Estimating/ Dredging/Construction	1977, B.S., Civil Engineering 1977, B.S., Physics 1988, M.B.A. 8 years, NOD-COE.	Overall Content, Dredging & Engineering Soundness
Mr. Alan B. Blake	Hydrogeology & Engineering Geology	1972, B.S., Geology 1978, M.S., Geology Registered Professional Geologist	Coastal Geology, Geomorphology Geotechnology
Mr. Joseph L. Chow	Civil Engineering	18 years, NOD-COE. 1979, B.A., Economics 1981, B.S., Civil Engineering 1987, M.E., Civil Engineering 9 years, NOD-COE.	EIS Coordinator (Engineering Division)
Mr. Gary Rauber	Civil Engineering	1974, B.S., Civil Engineering Registered Professional Engineer. 15 years, NOD-COE.	Waterways

6. PUBLIC INVOLVEMENT

6.1. PUBLIC INVOLVEMENT PROGRAM AND STUDY HISTORY

The public involvement for this project extends back to the original scoping meetings which were held in 1986 to gather input for all the proposed shell dredging activity in Four League Bay, Atchafalaya Bay, East and West Cote Blanche Bays, Vermilion Bay, and a narrow strip along the Gulf coast from Isles Derniers to south of White Lake.

As that EIS study progressed, it became evident that the overall public interest would be best served by further subdividing the EIS preparation. The first EIS addressed impacts specifically in Four League Bay, Atchafalaya Bay, and East Cote Blanche Bay. This new EIS addresses impacts in the narrow strip along the Gulf coast from Isles Derniers to East Cote Blanche Bay.

There was considerable public input to the draft EIS for the Bay dredging activities. All the major public concerns such as impacts to water quality, biological and botanical resources are again addressed in this EIS. During the course of preparing this EIS, there were numerous meetings between government agencies, shell dredgers, and public officials.

6.2. REQUIRED COORDINATION ON DRAFT EIS

Circulation of the draft EIS to the Congressional Delegation, Federal agencies, state agencies, and other interested parties for their review accomplished the required coordination as provided under the National Historic Preservation Act and National Environmental Policy Act. Endangered species coordination with U.S. Fish and Wildlife Service and National Marine Fisheries Service is included in Appendix E.

6.3. STATEMENT RECIPIENTS

The agencies or persons listed below received copies of the draft EIS.

MEMBERS OF CONGRESS

Honorable Richard Baker
Honorable John Breaux
Honorable Jimmy Hayes
Honorable Clyde Holloway
Honorable Jerry Huckaby

Honorable William Jefferson
Honorable J. Bennett Johnston
Honorable Robert Livingston
Honorable Jim McCrery
Honorable Billy Tauzin

FEDERAL AGENCIES

Advisory Council on Historic Preservation, Washington, D.C. and
Golden, CO

Department of the Interior, Office of Environmental Affairs
Federal Emergency Management Administration, Washington, D.C.
Federal Highway Administration, Division Administrator
National Marine Fisheries Service, Center for Wetland Resources
National Marine Fisheries Service, Habitat Conservation Division
U.S. Department of Agriculture, Forest Service, Environmental
Coordinator
U.S. Department of Agriculture, Soil Conservation, National
Environmental Coordinator
U.S. Department of Agriculture, Soil Conservation Service,
Boutte, La.
U.S. Department of Commerce, National Oceanic & Atmospheric
Administration
U.S. Department of Commerce, Office of Ecology and Conservation
U.S. Department of Energy, Office of Environmental Compliance,
Washington, D.C.

FEDERAL AGENCIES (continued)

U.S. Department of Health and Human Services, Center for Disease Control, Atlanta

U.S. Department of Health and Human Services, Washington, D.C.

U.S. Department of Housing and Urban Development, Regional Administrator, Region VI

U.S. Environmental Protection Agency, Federal Activities Branch, Region VI

U.S. Environmental Protection Agency, Office of Federal Activities, Director

U.S. Fish and Wildlife Service, Field Supervisor, Lafayette, La.

STATE AGENCIES

Atchafalaya Basin Levee District

Louisiana Attorney General's Office, Assistant Attorney General, State Lands and National Resources

Louisiana Board of Commerce Industry, Research Division

Louisiana Department of Agriculture and Forestry, Office of Agriculture and Environmental Science

Louisiana Department of Agriculture and Forestry, Office of Forestry

Louisiana Department of Culture, Recreation, and Tourism, Office of State Parks, Division of Outdoor Recreation

Louisiana Department of Culture, Recreation, and Tourism, State Historic Officer

Louisiana Department of Environmental Quality, Inactive and Abandoned Sites

Louisiana Department of Environmental Quality, Office of the Secretary

Louisiana Department of Environmental Quality, Solid and Hazardous Waste

Louisiana Department of Environmental Quality, Water Pollution Control Division

STATE AGENCIES (continued)

Louisiana Department of Health and Hospitals, Office of Health Services and Environmental Quality

Louisiana Department of Natural Resources, Assistant Secretary, Office of Coastal Restoration and Management

Louisiana Department of Natural Resources, Consistency Coordinator, Office of Coastal Restoration and Management, Coastal Management Division

Louisiana Department of Natural Resources, Division of State Lands

Louisiana Department of Natural Resources, Louisiana Geological Survey

Louisiana Department of Natural Resources, Office of Coastal Restoration and Management, Coastal Restoration Division

Louisiana Department of Transportation and Development, Environmental Engineer, Division of Flood Control and Water Management

Louisiana Department of Wildlife and Fisheries, Louisiana Natural Heritage Program

Louisiana Department of Wildlife and Fisheries, Secretary

Louisiana State Division of Administration, State Land Office

Louisiana State Planning Office

Louisiana State University, Center for Wetland Resources

Louisiana State University, Curator of Anthropology, Department of Geography and Anthropology

Louisiana State University, Government Documents Division, Library

Louisiana State University, Library, Coastal Studies Institute

Louisiana State University, Sea Grant Legal Program

Mayor, City of Berwick

Mayor, City of Morgan City

State - Times/Morning Advocate, Outdoor Editor

State of Louisiana, Office of the Governor, Technical Coordinator for Coastal Activities

St. Martin Parish Police Jury, St. Martinville, La.

St. Mary Parish Police Jury, Franklin, La.

STATE OFFICIALS

Honorable Edwin W. Edwards, Governor
Honorable Melinda Schwegmann, Lieutenant Governor
Honorable Fox McKeithen, Secretary of State
Honorable Richard Ieyoub, Attorney General
Honorable Bob Odom, Commissioner of Agriculture and Forestry
All Senators and Representatives from the affected project area.

LIBRARIES

Louisiana Department of Public Works
Louisiana Office of Commerce and Industry, Research Library
Louisiana State University Library System
University of New Orleans, Earl K. Long Library, Louisiana Collection
Tulane University, Howard - Tilton Library, Louisiana Collection
New Orleans Public Library, Louisiana Division
Iberia Parish Public Library, New Iberia, La.
St. Mary Parish Library, Franklin, La.
Terrebonne Parish Library, Main Branch, Houma, La.
Vermilion Parish Library, Abbeville, La.

SPECIAL INTEREST

Association of Louisiana Bass Clubs, President
AVOCA, Inc., President
Bonnet Carre Rod and Gun Club
Cactus Clyde Productions, Wildlife Photographer
CELMV-R, Chief
Clio Sportsman League
Conrad Industries, President
Continental Lands & Fur Co.
Current Boxholder

SPECIAL INTEREST (continued)

Environmental Defense Fund

Fina-Laterre Oil Co., Houma, La.

Gibbens & Blackwell, Attorneys-at-Law, New Iberia, LA

Governors Advisory Committee on Bicycling, Chairman

Gulf Coast Conservation Association

Gulf of Mexico Fisheries Management Council, Tampa, FL

Gulf States Marine Fisheries

Jefferson Parish, Environmental Impact Officer

Lafayette Natural History Museum & Planetarium

Lake Pontchartrain Basin Foundation

Lake Pontchartrain Sanitary District

League of Women Voters of Louisiana

Louisiana Land & Exploration

Louisiana Nature & Science Center

Louisiana State University, Center for Wetlands Resources, Ports &
Waterways Institute

Louisiana State University, Louisiana Wildlife Federation, Executive
Director

Louisiana Tech University, College of Administration and Business,
Dept. of Economic & Finance

Mid-Continent Oil & Gas Association

Middle South Services, Inc., Manager

Mosquito Control Board, Administrator

National Audubon Society, Field Research Director, Chairman

National Audubon Society, Southwestern Regional Office, Regional
Representatives

National Wildlife Federation, Washington, D.C.

Natural Resources Defense Council, New York, N.Y.

New Orleans Bicycle Awareness Committee

Orleans Audubon Society, Conservation Chairman

St. Mary Parish Land Co., Lafayette, LA

SPECIAL INTEREST (continued)

Sierra Club, Delta Chapter

Sierra Club, Honey Island Group, Lacombe, LA

Sierra Club, Legal Defense

South Central Planning and Development, Thibodaux, LA

South Louisiana Environmental Council, Houma, LA

Swiftships, Inc., President

T Baker Smith & Son, Inc., Houma, LA

Tennessee Gas Pipeline, Houston, TX

Terrebonne Fishermans Organization, President, Dulac, LA

Terrebonne Parish Council, Waterways & Permit Committee, Houma, LA

The Fund For Animals, Inc., Field Agent

Thompson Marine Transportation, Morgan City, LA

Tulane University, Tulane Law School

Walk Haydel & Associates, Chairman

Williams, Inc., Patterson, LA

Comment letters received and the responses to those comments are presented in Appendix F.

7.

LITERATURE CITED

Arndt, R. H. 1976. The shell dredging industry in A. H. Bouma, Ed. Shell Dredging and its Influence on Gulf Coast Environments. Gulf Publishing Co., Houston, Texas. 454 pp.

Barnett, W. 1990. The Economic Impact of Shell Dredging on the Central Louisiana Gulf Coast. (Unpublished).

Barnett, W. 1986. Response to U.S. corps of Engineers Request for Information for Draft Environmental Impact Statement Re Shell Dredging: Lakes Pontchartrain and Maurepas and Central Louisiana Gulf Coast. (Unpublished).

Barrett, B. B., J. L. Merrell, T. P. Morrison, M. C. Gillespie, E. J. Ralph and J. F. Burdon. 1978. A study of Louisiana's major estuaries and adjacent offshore waters. Louisiana Department of Wildlife & Fisheries, Technical Bulletin Number 27, New Orleans, Louisiana.

Baumann, R. H., J. W. Day, Jr. and C. A. Miller. 1984. Mississippi deltaic wetland survival: sedimentation versus coastal submergence. Science 224:1093-1095.

Boesch, D. F., D. Levin, D. Nummedal and K. Bowles. 1983. Subsidence in coastal Louisiana: causes, rates, and effects on wetlands. U. S. Fish and Wildlife Service Biological Services Program, FWS/OBS-83/26, Washington, D.C.

Boesch, D. F. and N. N. Rabalais, editors. 1989. Produced waters in sensitive coastal habitats: An analysis of impacts, Central Gulf of Mexico. OCS Report/MMS 89-0031, U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office, New Orleans, Louisiana, 157 p.

Britsch, L.D. and E. B. Kemp. 1990. Land loss rates: Mississippi River deltaic plain. Technical Report GL-90-2 U.S. Army Engineer District, New Orleans. Butler, P. A. 1954.

Butler, P.A. 1954. Summary of our knowledge of the oyster in the Gulf of Mexico. U. S. National Marine Fisheries Service Fishery Bulletin 87:479-489.

Chabreck, R. H. 1972. Vegetation, water and soil characteristics of the Louisiana coastal region. Louisiana State Agricultural Experiment Station, Bulletin Number 664, Baton Rouge, Louisiana.

Coleman, J. M. 1966. Recent coastal sedimentation: central Louisiana coast. Louisiana State University Press, Baton Rouge, Louisiana.

Coleman, J. M., H. H. Roberts and R. S. Tye. 1985. Causes of Louisiana land loss. Louisiana Mid-Continent Oil and Gas Association, Baton Rouge, Louisiana.

Craig, N. J., R. E. Turner and J. W. Day, Jr. 1979. Land loss in coastal Louisiana. Pages 227-254 in J. W. Day, Jr., D. D. Culley, Jr., R. E. Turner and A. J. Mumphrey, Jr., editors. Proceedings of the Third Coastal Marsh and Estuary Management Symposium. Louisiana State University Division of Continuing Education, Baton Rouge, Louisiana.

Darnell, R. M., R. E. Defenbaugh and D. Moore. 1983. Northwestern Gulf Shelf bio-atlas: a study of the distribution of demersal fishes and penaeid shrimp of soft bottoms of the continental shelf from the Rio Grande to the Mississippi River delta. Open File Report 82-04. U. S. Department of Interior Minerals Management Service, Metairie, Louisiana.

Demas, C. R. 1976. Analysis of native water, bed material and elutriate samples of major Louisiana waterways, 1975. U. S. Geological Survey, Report 76-853, Washington, D.C.

Demas, C. R. and P. C. Higgins. 1977. Analysis of native water and dredged material from southern Louisiana waterways, 1975-76. U. S. Geological Survey, Report 77-503, Washington, D.C.

Douglass, G., Jr. 1986. The Louisiana shell industry. Louisiana Shell Producers Association, New Orleans, Louisiana.

DRAVO. 1986. Dredge Cut Surveys. Dravo Basic Materials Unpublished Data.

Dugas, R. J. 1975. Variation in day-night trawl catches in Vermilion Bay, Louisiana. Louisiana Wildlife and Fisheries, Technical Bulletin Number 14, New Orleans, Louisiana.

Glasgow, L. L. 1968. The history and regulation of the shell dredging industry in Louisiana compiled by the Louisiana Wildlife and Fisheries Commission, September 1968.

Gosselink, J. G. 1984. The ecology of delta marshes of coastal Louisiana: a community profile. U.S. Fish and Wildlife Service FWS/OBS - 84-09. 134 pp.

Gosselink, J. G., C. L. Cordes and J. W. Parsons. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. Volumes 1, 2 & 3. U. S. Fish and Wildlife Service Biological Services Program, FWS/OBS-9,10,11, Washington, D.C.

Gulf South Research Institute. 1977. Environmental study of shell dredging along the central Louisiana coast. Volumes 1 and 2. GSRI Project Number 414-744-41, New Iberia, Louisiana.

Hoese, H. D. 1974. Comparison of benthic fauna and selected physical parameters in dredged and undredged areas in Four League Bay, Louisiana. University of Southwestern Louisiana, Lafayette, Louisiana.

Hoese, H. D. 1976. Final report. Study of sport and commercial fishes of the Atchafalaya Bay region. Conducted for the U.S. Fish and Wildlife Service by the Department of Biology, University of Southwestern Louisiana, Lafayette.

Jones, J. J. 1972. Faunal destruction and recovery following shell dredging in Mobile Bay, a pilot study. Unpublished report to Radcliff Materials, Inc., New Orleans, Louisiana.

Jones, P. H., A. N. Turcan, Jr. and H. E. Skibitzke. 1954. Geology and ground-water resources of southwestern Louisiana. Department of Conservation, Louisiana Geological Survey, Geological Bulletin Number 30, Baton Rouge, Louisiana.

Juneau, C. L., Jr. 1975. An inventory and study of the Vermilion Bay - Atchafalaya Bay complex. Louisiana Wildlife and Fisheries Commission. Technical Bulletin Number 13, New Orleans, Louisiana.

Juneau, C. L., Jr. 1984. Shell dredging in Louisiana 1914-1984.
Louisiana Department of Wildlife and Fisheries, Baton Rouge,
Louisiana.

Louisiana Department of Environmental Quality, Water Pollution Control
Division. 1989. Final Rule LAC 33 Part IX Chapter 11.
Louisiana Surface Water Quality Standards. Department of
Environmental Quality, Baton Rouge, Louisiana.

Louisiana State Planning Office. 1972. Land Use and Data Analysis
Program. U. S. Geological Survey.

Louisiana Tax Commission. 1986. Twenty-second biennial report, 1984-
1985. Baton Rouge, Louisiana.

Maruggi, V. and S. D. Hartl. 1981. Statistical abstract of Louisiana,
seventh edition. University of New Orleans, New Orleans,
Louisiana.

May, E. B. 1973. Environmental effects of hydraulic dredging in
estuaries. Alabama Department of Conservation and Natural
Resources, Alabama Marine Resources Bulletin Number 9, Dauphin
Island, Alabama.

Minerals Management Service, U. S. Dept. of the Interior. 1990.
Letter to Lease Operators Explaining Revised Shipwreck Probability
Assignments with Accompanying Map. November 30, 1990.

Morgan, J. P. and P. B. Larimore. 1957. Changes in the Louisiana
shoreline. Transactions of the Gulf Coast Association of
Geological Societies 7:303-310.

Morgan, J. P., J. R. Van Lopik and L. G. Nichols. 1953. Occurrence and development of mudflats along the western Louisiana coast. Coastal Studies Institute, Technical Report 2, Baton Rouge, Louisiana.

Neff, J. M., and T. C. Sauer and N. Maciolek. 1989. Fate and Effects of Produced Water Discharges in Nearshore Marine Waters. American Petroleum Inst. Publ. No. 4472, American Petroleum Institute, Washington, D.C. 300 p.

Nummendal, D. 1982. Future sea level changes along the Louisiana coast. Pages 164-176 in D. F. Boesch, editor. Proceedings of the Conference on Coastal and Wetland Modification in Louisiana: Causes, Consequences and Options. U. S. Fish and Wildlife Service, Biological Services Program, FWS/OBS 82/59, Washington, D.C.

Orth, R. J. 1974. The importance of sediment stability in seagrass communities. Belle W. Baruch Institute for Marine Biology 6:281-300.

Pearson, C. E. et al. 1989. A History of Waterborn Commerce and Transportation Within the U.S. Army Corps of Engineers New Orleans District and an Inventory of Known Underwater Cultural Resources. New Orleans District Corps of Engineers.

Penland, S. and R. Boyd. 1982. Assessment of geological and human factors responsible for Louisiana coastal barrier erosion. Pages 14-38 in D. F. Boesch, editor. Proceedings of the Conference on Coastal Erosion and Wetland Modification in Louisiana: Causes, Consequences, and Options. U. S. Fish and Wildlife Service Biological Services Program, FWS/OBS-82/59, Washington, D.C.

Rabalais, N. N. and D. F. Boesch. 1985. Dominant features and processes of continental shelf environments of the United States. Pages 3-1 to 3-71 in D. F. Boesch and N. N. Rabalais, editors. The Long Term Effects of Offshore Oil and Gas Development: An Assessment and A Research Strategy. LUMCON, Chauvin, Louisiana.

Ragan, J. G., E. J. Melancon, A. H. Harris, R. N. Falgout, J. D. Gann and J. H. Green. 1978a. Bottomfishes of the continental shelf off Louisiana. Nichols State University, Professional Paper Series Number 2, Thibodaux, Louisiana. 34 pp.

Ragan, J. G., A. H. Harris and J. H. Green. 1978b. Temperature, salinity and oxygen measurements of surface and bottom waters on the continental shelf off Louisiana during portions of 1975 and 1976. Nichols State University, Professional Paper Series Number 3, Thibodaux, Louisiana. 29 pp.

Randall, J. M. 1986. Dynamics of aquatic primary production in a turbid Louisiana estuary. M.S. Thesis, Louisiana State University, Baton Rouge. 80 pp.

Sellers, Dubroc and Associates, Inc. 1980. Atchafalaya River Basin Water Quality Management Plan. Phase II. Prepared for the Louisiana Department of Natural Resources Division of Water Pollution Control.

Shelmon, R. J. 1973. Atchafalaya Bay, Louisiana: regional subsidence and contemporary delta formation. Transactions of the Gulf Coast Association of Geological Societies 23:22-26.

Smith, L. M., J. B. Dunbar and L. D. Britsch. 1986. Geomorphological investigation of the Atchafalaya Basin, Area West, Atchafalaya Delta and Terrebonne Marsh. U. S. Army Corps of Engineers, Vicksburg District, Technical Report GL-86-3, Vicksburg, Mississippi.

Steimle and Associates, Inc. 1985. Shell dredging engineering report. Prepared for Louisiana Materials Co., Inc. in accordance with Permits CUP No. P821165 and LMNOD-SP (Lake Pontchartrain) 130. Volumes 1 and 2.

Steimle and Associates, Inc. 1991. Produced Water Impacts on Louisiana Wetlands. American Petroleum Institute. Washington, D.C. 132 pp.

Taylor, J. L. 1972. Some effects of oyster shell dredging on benthic invertebrates in Mobile Bay, Alabama.

Theriot, E. C. 1976. Bay Phytoplankton. In C. F. Bryan, D. J. Demoont, D. S. Sabins and J. P. Newman. Annual Report. A limnological survey of the Atchafalaya Basin. Louisiana Cooperative Fishery Unit, Louisiana State University, Baton Rouge. 285 pp.

Turner, R. E. and R. L. Allen. 1982a. Bottom water oxygen concentration in the Mississippi River delta bight. Contributions in Marine Science 25:161-172.

Turner, R. E. and R. L. Allen. 1982b. Plankton respiration rates in the bottom waters of the Mississippi River delta bight. Contributions in Marine Science 25:173-179.

URS Company. 1980. Terrebonne Basin Water Quality Management Plan. Phase II. Prepared for the Louisiana Department of Natural Resources Division of Water Pollution Control.

U.S. Army Corps of Engineers, New Orleans District. 1982. Atchafalaya River, Louisiana. Ocean Dredged Material Disposal Site Designation.

U.S. Department of Commerce. 1983. NOAA: Charts Nos. 11344, 11349, 11351 and 11356. National Ocean Service.

U.S. Department of Commerce. National Marine Fisheries Service. 1989. Fisheries of the United States. Current Fishery Statistics No. 8360. Washington, D. C. 121 pp.

U.S. Department of Interior. 1984. Final Environmental Impact Statement for Central Gulf of Mexico Proposed OCS Oil and Gas Lease Offerings. Minerals Management Service Gulf of Mexico OCS Region, Metairie, Louisiana.

U.S. Environmental Protection Agency. 1978. Compilation of air pollutant emission factors. Office of Air Quality Planning and Standards, Publication Number AP-42. 3rd Edition. Research Triangle Park, North Carolina.

van Heerden, I. L. 1983. Deltaic sedimentation in eastern Atchafalaya Bay, Louisiana. Louisiana Sea Grant College Program. Louisiana State University Center for Wetland Resources, Louisiana State University.

Van Lopik, J. R. 1955. Recent geology and geomorphic history of central coastal Louisiana. Louisiana State University Coastal Studies Institute, Technical Report 7, Baton Rouge, Louisiana.

Vittor and Associates, Inc. 1984. Taxonomic guide to the Polychaetes of the Northern Gulf of Mexico. Prepared for the Minerals Management Service, Gulf of Mexico OCS 7 volumes.

Water Resource Engineers. 1980. Barataria Basin Water Quality Management Plan. Phase II. Prepared for the Louisiana Department of Natural Resources Division of Water Pollution Control.

Wells, J. T. and G. P. Kemp. 1981. Atchafalaya mud stream and recent mudflat progradation: Louisiana Chenier Plain. Transactions of the Gulf Coast Association of Geological Societies 31:409-415.

Wells, J. T. and G. P. Kemp. 1982. Mudflat and marsh progradation along Louisiana's Chenier Plain: a natural reversal in coastal erosion. Pages 39-51 in D. F. Boesch, editor. Proceedings of the Conference on Coastal Erosion and Wetland Modification in Louisiana: Causes, Consequences, and Options. U.S. Fish and Wildlife Service Biological Services Program, FWS/OBS-82/59, Washington, D.C.

Wells, J. T. and H. H. Roberts. 1980. Fluid mud dynamics and shoreline stabilization: Louisiana Chenier Plain. Pages 1382-1400. Proceedings of the 17th International Coastal Engineering Conference, ASCE. Sydney, Australia.

INDEX

	<u>Page</u>
Additional Restrictions on Dredging Discharge.....	EIS-17
Additional Restrictions on Dredging Intensity.....	EIS-17
Aesthetic Values	
Existing Conditions.....	EIS-104
Impacts of Alternatives.....	EIS-105
Algae and Phytoplankton	
Existing Conditions.....	EIS-66
Impacts of Alternatives.....	EIS-67
Alternative Materials.....	EIS-11
Alternative Permit Restrictions.....	EIS-16
Alternatives Considered in Detail.....	EIS-19
Archeology/Cultural Resources	
Existing Conditions.....	EIS-105
Impacts of Alternatives.....	EIS-107
Benthos	
Existing Conditions.....	EIS-73
Impacts of Alternatives.....	EIS-77
Biological Impacts.....	EIS-124
Business and Industrial Activity	
Existing Conditions.....	EIS-82
Impacts of Alternatives.....	EIS-86
Community Cohesion	
Existing Conditions.....	EIS-110
Impacts of Alternatives.....	EIS-111
Comparative Impacts of Alternatives.....	EIS-19
Comprehensive Overview of Cumulative Impacts.....	EIS-122
Cumulative Impacts.....	EIS-115
Description of the Proposed Action.....	S-1
Desirable Regional and Community Growth	
Existing Conditions.....	EIS-109
Impacts of Alternatives.....	EIS-109
Employment/Labor Force/Displacement of People	
Existing Conditions.....	EIS-88
Impacts of Alternatives.....	EIS-93
Endangered and Threatened Species	
Existing Conditions.....	EIS-81
Fisheries/Nekton	
Existing Conditions.....	EIS-68
Impacts of Alternatives.....	EIS-72

INDEX
(continued)

	<u>Page</u>
Geologic History.....	EIS-27
History of Shell Dredging in Coastal Louisiana.....	EIS-4
Holes and Troughs	
Existing Conditions.....	EIS-36
Impacts of Alternatives.....	EIS-46
Impacts of Corps of Engineers Civil Works Projects.....	EIS-119
Impacts of Other Permitted Activities.....	EIS-119
Impacts of Shrimping.....	EIS-117
List of Reviewers and Preparers.....	EIS-126
Literature Cited.....	EIS-137
Mineral Resources	
Existing Conditions.....	EIS-47
Impacts of Alternatives.....	EIS-52
Noise	
Existing Conditions.....	EIS-112
Impacts of Alternatives.....	EIS-112
Oyster Reefs	
Existing Conditions.....	EIS-78
Impacts of Alternatives.....	EIS-79
Physical-Chemical Impacts.....	EIS-123
Physiographic Features.....	EIS-28
Project Area Description.....	EIS-25
Property Values	
Existing Conditions.....	EIS-95
Impacts of Alternatives.....	EIS-95
Public Facilities Services and Transportation	
Existing Conditions.....	EIS-96
Impacts of Alternatives.....	EIS-99
Public Involvement.....	EIS-130
Public Involvement Program and Study History.....	EIS-130
Purpose and Need For the Proposed Action.....	EIS-1

INDEX
(continued)

	<u>Page</u>
Recreation	
Existing Conditions.....	EIS-114
Impacts of Alternatives.....	EIS-115
Reduced Restrictions on Areas Available for Dredging.....	EIS-18
Reduced Restrictions on Dredge Discharge.....	EIS-19
Reduced Restrictions on Dredging Intensity.....	EIS-18
Refuges and Wildlife Management Areas	
Existing Conditions.....	EIS-80
Impacts of Alternatives.....	EIS-81
 Sewage Introduced Into Near Shore Environment.....	EIS-116
Shell Dredging Techniques.....	EIS-4
Socio-Economic Impacts.....	EIS-125
Statement of Purpose and Need.....	EIS-1
Subsidence and Land Loss	
Existing Conditions.....	EIS-29
Impacts of Alternatives.....	EIS-35
Summary of Biological Impacts.....	S-7
Summary of Cumulative Impacts.....	S-11
Summary of Economic and Social Impacts.....	S-9
Summary of Endangered Species Impacts.....	S-4
Summary of Environmental Impacts.....	S-4
Summary of Geological Impacts.....	S-5
Summary of Hydrological Impacts.....	S-6
Summary of Judicial Requirements.....	S-13
Summary of Major Alternatives.....	S-4
Summary of Mitigation Measures.....	S-12
Summary of Physical Impacts.....	S-5
Summary of Water Quality Impacts.....	S-6
 Tax Revenues	
Existing Conditions.....	EIS-101
Impacts of Alternatives.....	EIS-102
 Urban and Agricultural Runoff.....	EIS-116
 Water Column and Sediment Quality	
Existing Conditions.....	EIS-53
Impacts of Alternatives.....	EIS-62

APPENDIXES

April, 1994

APPENDIX A

SUPPLEMENTAL INFORMATION

SHELL DREDGING PERMIT APPLICATION

SUPPLEMENTAL INFORMATION
SHELL DREDGING PERMIT APPLICATION
ATCHAFALAYA AREA

LOUISIANA DREDGING COMPANY

Material to be dredged

The material to be dredged is an oyster shell material which is covered by bottom sediment. The thickness of these deposits varies from four to eight feet. Chemically the shells are approximately 98% Calcium Carbonate (CaCO₃).

Operations and Equipment

All operations are conducted in areas designated by the Louisiana Wildlife & Fisheries Commission and in accordance with their lease conditions. Shell dredges are basically barge-like in design, with an excavating cutterhead and screening plant. Shell recovery is accomplished by hydraulic suction head and is pumped over a series of sizing screens and washers. The processed shell is then conveyed aboard barges for delivery to land distribution terminals. Spoil material is directed back into the dredged cut through a submerged discharge pipe. Pages 2 thru 5 of the attached are illustrations of the spud dredging method.

Pollution Control

Fuel delivery and transfer to the dredge is made in Coast Guard approved barges and holding tanks. Engine oil changes are pumped into sealed disposal tanks and shipped to reclamation terminals. Garbage and trash are brought to land disposal units to be picked up by local sanitation departments.

Past studies indicate that 98% of the discharged sediment settles out within 200 feet of the dredge. Spoil material discharged into the original dredge cut consists only of the same material which was excavated from this same area. No foreign matter is introduced to the system and only the shells are removed.

Economics

Shell, which is 98% CaCO₃, is an important industrial raw material. It is used in road and plant site construction, manufacture of portland cement, lime, poultry and cattle feed supplements, acid neutralization water purification, clutch for live oyster reefs, and many other applications. Because there are no limestone deposits on the Gulf Coast there is no locally available alternate type material.

This shell dredging operation would directly employ approximately 100 people. In addition to those directly employed, there would be employment provided in associated and service industries such as trucking, welding, shipyards, fuel and lubricant services, etc.

The state of Louisiana will receive royalty payments for all shell material which is removed as a result of this operation.

Conditions for Operations

1. Louisiana Dredging Company will abide by all rules and regulations concerning shell dredging issued by the Louisiana Wildlife and Fisheries Commission and the Louisiana Department of Wildlife and Fisheries (WL&F).
2. All operations will be conducted in compliance with the U.S. Environmental Protection Agency, U.S. Coast Guard, and the Louisiana Department of Natural Resources rules, restrictions and regulations.
3. If any archaeological or historical materials (i.e., pottery, bone, timbers, ship fittings, etc.) are encountered, the locations of these finds will be mapped and the Corps and the State Historic Preservation Officer (SHPO) will be immediately notified. Dredging will be discontinued in that area until Corps approval is given to resume dredging activities in the subject area.
4. Louisiana Dredging Company shall not operate more than two shell dredges at any given time within the area covered by this permit.
5. The applicant is aware that some conditions or restrictions imposed by the Louisiana Department of Wildlife and Fishers and the Department of Natural Resources may be more stringent than the restrictions specifically identified in a Department of the Army permit.

6. The applicant shall insure that all sanitary sewage and/or related domestic wastes generated during the subject project activity and at the site, thereafter, as may become necessary shall receive the equivalent of secondary treatment with a disinfectant prior to discharge into any of the streams or adjacent waters of the area, or in the case of total containment, shall be disposed of in approved sewerage and sewage treatment facilities, as is required by the State Sanitary Code.

7. All requirements imposed by the Louisiana Department of Wildlife and Fisheries in the Shell Dredging Lease will be complied with.

8. The dredge discharge shall be directed over the dredge cut.

9. The applicant is aware that the District Engineer may place additional restrictions on this permit at any time should new information or data show that such permit modification is necessary for the conservation of renewable natural resources.

DEC-14-93 TUE 10:34

DBMC ST. ROSE, LA.

FAX NO. 5044553595

P.02



DEPARTMENT OF NATURAL RESOURCES
COASTAL MANAGEMENT DIVISION
P. O. BOX 44487
BATON ROUGE, LOUISIANA 70804-4487
(504) 342-7591

017

COASTAL USE PERMIT/CONSISTENCY DETERMINATION

C.U.P. No. P910187(Amended)

GOF No. 1 MANN SW(Gulf of Mexico) 356R

NAME AND ADDRESS: LOUISIANA DREDGING CO.: ATTN: Mr. Richard B. Koen, P.O. Box 8214, New Orleans, LA 70182

LOCATION: INPORTA AIN CT, NAVY PARTCHING, LA: Portion of East Cote Blanche Bay and Atchafalaya Bay under lease by the La. Dept. of Wildlife and Fisheries.

PROJECT DESCRIPTION: To remove shell material in portions of East Cote Blanche and Atchafalaya Bays under the terms of a La. Dept. of Wildlife and Fisheries lease. Dredging will take place using spud dredges.

AMENDED PERMIT

(Supersedes Permits Issued August 16, 1991 and September 26, 1991)

In accordance with the rules and regulations of the Louisiana Coastal Resources Program and Louisiana R.S. 49, Sections 213.1 to 213.21, the State and Local Coastal Resources Management Act of 1978, as amended, the permittee agrees to:

1. Carry out or perform the use in accordance with the plans and specifications approved by Department of Natural Resources.
2. Comply with any special conditions imposed by the Department of Natural Resources.
3. Reduce, alter, or remove any structures or sites placed outside of the permitted area in the opinion of the Department of Natural Resources, if proven to be beyond the scope of the use as approved or is abandoned.
4. Insure, if required by the Department of Natural Resources, liability against an appropriate amount to ensure adjustment, alteration, or removal should the Department of Natural Resources determine it necessary.
5. Hold and save the State of Louisiana, the local government, the department, and their officers and employees harmless from any damage to persons or property which might result from the use, including the work, activity, or structure permitted.
6. Certify that the use has been completed in an acceptable and satisfactory manner and in accordance with the plans and specifications approved by the Department of Natural Resources. The Department of Natural Resources may, when appropriate, require such certification be given by a registered professional engineer.
7. All terms of the permit shall be subject to all applicable federal and state laws and regulations.
8. This permit or a copy thereof shall be available for inspection at the site of work at all times during operations.
9. The applicant will notify the Coastal Management Division of the date on which initiation of the permitted activity described under the "Coastal Use Description" began. The applicant shall notify the Coastal Management Division by mailing the enclosed green initiation card on the date of initiation of the coastal use.
10. Unless otherwise stated in this permit, this permit authorizes the initiation of the coastal use described under "Coastal Use Description" for two years from the date of the signature of the Secretary or his designee. If the coastal use is not initiated within this period, then this permit will expire and the applicant will be required to submit a new application for the use, including the specific activities for which the permit is required. Initiation does not include preparatory activities, such as movement of equipment onto the coastal use site, expenditure of funds, contracting out of work, or performing activities which by themselves do not require a permit. In addition, the permittee must, in good faith and with due diligence, reasonably progress toward completion of the project once the coastal use has been initiated.
11. This Coastal Use Permit authorizes periodic maintenance, but such maintenance activities must be conducted pursuant to the specifications and conditions of this permit.
12. The following special conditions must also be met in order for the use to meet the guidelines of the Coastal Resources Program:

DEC-14-93 TUE 10:36

DEM ST. ROSE, LA.

FAX NO. 5044683586

P.03

Page

Two

D17

C.U.P. No.

P910187(Amended)

C.O.E. No.

LMN00-SW(Gulf of Mexico)3548

a. Monitoring System

1. Permittee shall, at its expense, install a Loran-C continuous location recording system (accurate to 100 feet) or a similar device acceptable to the Department of Wildlife & Fisheries and the Department of Natural Resources on each operating shell dredge prior to initiation of work. The system shall be certified tamper-proof by the manufacturer and accessible to the Coastal Management Division (CMD), La. Department of Wildlife & Fisheries (LDWF) or their designees. Permittee shall notify CMD/DNR by phone within one (1) working day and by letter within seven (7) days after a malfunction of the system. Each dredge shall remain within 1,000 feet of its position at the time the malfunction occurs until CMD and LDWF have been contacted.

"Should a malfunction occur during CMD non-working hours, permittee shall make reasonable efforts to notify CMD personnel at telephone numbers to be supplied to permittee. If after reasonable efforts, permittee is unable to notify CMD, dredges may continue to operate but CMD shall be notified as soon as possible and in no event more than one (1) CMD working day after the malfunction occurs. Dredging operations may continue during these periods, but permittee shall insure that no restricted zones are entered."

2. Hourly dredge positions as measured by Loran C and positions measured by triangulation surveys with Del Norte trisponder instruments (or instrument of equal or greater accuracy) which tie all points to Lambert X and Y coordinates, Loran T.D. and longitude and latitude, and having an accuracy of $\pm 10'$ and records of all restricted boundaries which were surveyed and marked shall be maintained by permittee and shall be made available on a confidential basis to CMD staff within two (2) working days of any written or verbal request.
3. A copy of the weekly dredge location reports shall be submitted to CMD. Weekly reports to CMD shall include records of the dredge location (Loran-C TD's and Latitude and Longitude) during every twelve (12) hour period, the location of subaqueous (submerged) and subaerial (exposed) reefs or pipelines and gathering lines associated with mineral production encountered during surveys.



Page Three
 C.U.P. No. P910187(Amended)
 C.O.E. No. LMNOD-SW(Gulf of Mexico)3548

D17

b. Permit Violations

Permittee shall be subject to the following actions under La. R.S. 49:214.36 for violation of any condition of this permit:

- a. The issuance of cease and desist orders;
- b. The suspension, revocation, or modification of this permit;
- c. The institution of judicial action for an injunction, declaratory relief, or other remedy as may be necessary to insure against activities not in conformance with law regulations or this permit;
- d. The imposition of civil liability and assessment of damages;
- e. The issuance of orders where feasible and practical for the payment of restoration cost or for actual restoration of areas disturbed;
- f. The imposition of other reasonable and proper sanctions for uses conducted within the coastal zone not in accordance with law, regulations or this permit;
- g. The imposition of cost and reasonable attorneys fees where appropriate; and
- h. The imposition of a fine of not less than \$100 and not more than \$500, or imprisonment for not more than ninety (90) days, or both, in instances where permittee is found to have knowingly and intentionally violated the law, rules and regulations, or any conditions of this permit.

c. Offsite Restoration

As compensation for disturbance of the water bottom during dredging, the permittee shall, at its sole expense, undertake offsite restoration for improvement of the marine environment. Such restoration shall be as follows:

1. One (1) acre of shell reef one (1) foot thick for every 200,000 cubic yards dredged from the permitted area;
2. Restoration reefs shall be no less than one (1) acre in size and shall be located in areas which are restricted from shell dredging.

The location and size of such reefs shall be determined by the Department and all expense, including transportation and deposition shall be borne by permittee.

It is further provided that any offsite restoration undertaken by permitted pursuant to the conditions of any leases issued by the La. Department of Wildlife and Fisheries or permits issued by any other State or Federal agencies shall constitute partial or complete satisfaction of the above requirement, in a proportional amount based upon the amount of offsite restoration provided. The La. Department of Wildlife and Fisheries shall determine, in writing, the level of reduction of the amount of above requirement.



Page	Four	017
C.U.P. No.	P910187(Amended)	
C.O.E. No.	LMNOD-SW(Gulf of Mexico)3548	

d. Restricted Areas

1. No dredging shall occur during the period of this permit in the following restricted areas:
 - a. Within 1,000 feet of subaerial (exposed) shell reefs; permittee shall not dredge subaqueous (submerged) shell reefs. Subaqueous shell reefs shall be defined as those reefs which are above the water bottom but beneath the water level at Gulf Coast Low Water Datum (GCLWD). Subaerial reefs are those above the water level of the GCLWD.
 - b. Within areas per agreement between the Louisiana Department of Justice (LDJ) and the Louisiana Department of Wildlife and Fisheries Commission (LWFC). These areas are identified in a letter dated December 10, 1976, from LDJ to LWFC. These areas are located along and to either side of a line from South Point on Marsh Island to Point Au Fer Reefs, and includes waters to either side of the baseline from which the territorial sea is measured.
 - c. Within 0.5 miles of the existing shoreline in Atchafalaya Bay and East Cote Blanche Bay. "Shoreline" is defined as the landmass-water interface at 0.0 ft. Gulf Coast Low Water Datum. The permittee shall insure that Loran C coordinates of dredge locations, as plotted on appropriate navigation charts, be no closer than 0.25 statute miles from these shorelines.
 - d. In the area of the Atchafalaya River delta within lines connected by the following coordinates:

<u>Latitude/Longitude</u>	<u>X-Y Coordinates</u>
29°25'24"	2038469.5
91°12'45"	275180.8
29°24'24"	2024058.5
91°15'28"	269107.9
29°23'28"	2024062.2
91°15'28"	263451.3
29°23'28"	1987526.6
91°22'21"	263445.5
29°30'03"	1987540.2
91°22'21"	303344.3



Page Five
 C.U.P. No. P910187(Amended)
 C.O.E. No. LMNOD-SW(Gulf of Mexico)3543

017

In the area of Wax Lake Outlet delta within lines connected by the following coordinates:

<u>Latitude/Longitude</u>	<u>X-Y Coordinates</u>
29°30'03" 91°22'21"	1987540.2 303344.3
29°26'51" 91°28'36"	1964987.9 283965.1
29°29'48" 91°29'39"	1948833.2 301862.9
29°32'06" 91°30'06"	1946467.7 315805.7

The coordinates defining the restricted dredging area around the developing deltas are subject to change and refinement as a result of intergovernmental agency review with the permittee. Additionally, the group will give consideration to allowing dredging in the restricted areas to remove silt to reopen access to existing channels for navigational purposes.

- e. Within 300 feet of any active oil or gas production or drilling facility. Within 300 feet of an active oil and gas well platform or active production facility platform.
- f. Over pipelines without specific approval by the pipeline operator/owner.
- g. Within one (1) mile of Marsh Island.
- 2. Any of the areas described above which are not excluded by the La. Department of Wildlife and Fisheries may be dredged by the permittee only upon the approval of the Secretary of the La. Dept. of Natural Resources after consultation with the Secretary of the La. Department of Wildlife and Fisheries after a public hearing in the parish where the proposed dredging is to take place.

e. Number of Dredges

Permittee shall not operate more than two (2) shell dredges at any given time within the area covered by this permit. The number of dredges may be increased only after administrative review by the Secretary of Natural Resources. The Secretary may require the submission of additional environmental data before allowing any additional dredges.



DEC-14-93 TUE 10:43

DSMC ST. ROSE, LA.

FAX NO. 5044563586

P.07

Page Six

D17

C.U.P. No. P910187(Amended)

C.O.E. No. LMNOD-SW(Gulf of Mexico)3546

f. Archaeological Restrictions

In order to satisfy the requirements of the Abandoned Shipwreck Act of 1987 (Public Law 100-298) and the State Archaeological Resource Act of 1974 (R.S. 41:1601-1614, as amended in Act 291 of 1989), a plan for the surveying/preservation of underwater cultural resources shall be developed and approved by the La. Department of Culture, Recreation and Tourism, Division of Archaeology, before any work allowed by this Coastal Use Permit is commenced.

g. Dredge Discharge

Effluent shall be directed back into the dredged area via a discharge conduit. Dredged areas shall be surveyed with a recording fathometer and copies of each depth profile shall be submitted to CMD on or before the 15th day of the succeeding month. Maximum depth along with the vertical scale shall be indicated on each profile. Location of depth profiles shall be specified using precise Loran-C coordinates and Latitude/Longitude.

h. Comprehensive Study of Ecological Effects

Permittees shall cooperate with CMD/DNR and/or LDWF and/or the Coastal Environment Protection Trust Fund Task Force or their designees in a comprehensive study of the ecological effects of fossil oyster shell dredging within the central Louisiana coastal area which includes Atchafalaya Bay and East Cote Blanche Bay. Permittee shall be required to furnish any and all data available to it in connection with such study. Such study may include but shall not be restricted to an investigation of water quality, benthic community and shoreline variations which may be caused by shell dredging operations.

i. Permit Term and Review; Modification, Suspension, Revocation

1. The expiration date of this permit is five (5) years from the date of the signature of the Secretary or his designee on the original permit which was August 16, 1991, unless sooner modified, revoked, or suspended pursuant to this paragraph.



DEC-14-93 TUE 10:45

DBRG ST. ROSE, LA.

FAX NO. 5044883586

P.08

Page Seven
C.U.P. No. P910187(Amended)
C.O.E. No. LMNOD-SW(Gulf of Mexico)3548

D17

2. The Secretary shall formally review this permit and the activities conducted under it on or before the second and fourth anniversaries of the effective date. These formal reviews shall evaluate the impacts of authorized activities upon the permitted areas in light of recent, relevant data and information. The Secretary shall call an inter-agency review meeting with representatives of the Louisiana Departments of Natural Resources, Wildlife and Fisheries and Environmental Quality, the U.S. Environmental Protection Agency, National Marine Fisheries Service, U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers to discuss said information and data together with any permit modifications suggested by the attendees. Recommendations by state resource agencies for permit modifications will be carefully and fully considered by the Secretary, in recognition of the expertise and statutory responsibility of these agencies. The Secretary will provide, within 60 days, a written response to any state agency involving a request for a permit modification, if he decides not to make the recommended modification to this permit.
3. In addition to the formal permit reviews established by Paragraph I(2), the Secretary may, at any time, conduct an agency review of this permit and the authorized activities to assure that said activities are in conformity with the permit conditions and the coastal management program, or as the Secretary deems necessary. The Secretary may modify the term or conditions of this permit or may add conditions and restrictions as the result of a formal or agency review.
4. In addition to the sanctions or measures specified in Paragraph B, the Secretary may suspend or revoke this permit for good cause, other than permit condition violations, after providing thirty (30) days written notice to the permittee and an opportunity for the permittee to be heard on the alleged basis for the suspension or revocation. The Secretary may also suspend or revoke this permit pursuant to the procedures established in LAC, Title 43, Part I, Chapter 7, Sec. 723.D.2 and 3..
5. This permit authorizes activities upon State waterbottoms which have been leased to permittee. This permit conveys no separate property interest or right to conduct operations upon State waterbottoms, and termination of leases to those waterbottoms by agency action or final judgement of court shall constitute good cause for suspension or revocation of this permit. No further activities shall be authorized under this permit for any waterbottoms not leased to permittee, as of the date of any such termination.



DEC-14-93 TUE 10:47

DEMC ST. ROSE LA.

FAX NO. 5044583596

P.03

Page Eight

D17

C.U.P. No. P910187(Amended)

C.O.E. No. LMNOD-SW(Gulf of Mexico)3548

j. Additional Conditions

1. That the applicant shall insure that all sanitary sewage and/or related domestic wastes generated during the subject project activity and at the site, thereafter, as may become necessary shall receive the equivalent of secondary treatment (30 mg/l BOD₅; 30 mg/l TSS) with disinfection prior to discharge into any of the streams or adjacent waters of the area or, in the case of total containment, shall be disposed of in approved sewerage and sewage treatment facilities, as is required by those comments offered herein shall not be construed to suffice as any more formal approval(s) which may be required of possible sanitary details (i.e. provisions) scheduled to be associated with subject activity. Such shall generally require that appropriate plans and specifications be submitted to DHHR for purpose of review and approval prior to any utilization of such provisions.
2. The permittee shall send Coastal Management Division a copy of the monthly production reports as sent to La. Department of Wildlife and Fisheries and the Department of Revenue and Taxation.
3. The permittee shall permit routine field investigations by the Department of Natural Resources personnel aboard dredges or other facilities maintained by permittee.
4. Permitted activities, including the discharge of dredged materials, shall be conducted in accordance with applicable state and federal environmental statutes and regulations. This permit does not waive any permit or authorization which might be required by federal or state agencies to conduct operations nor does it authorize activities without said required permits or authorizations.

By accepting this permit the applicant agrees to its terms and conditions.

I affix my signature and issue this 16th day of October, 1991.

DEPARTMENT OF NATURAL RESOURCES

Terry W. Howey
TERRY W. HOWEY, DIRECTOR
Coastal Management Division

This agreement becomes binding when signed by the Director of the Coastal Management Division, Department of Natural Resources.



DEC-14-93 TUE 10:34

DBMC ST. ROSE, LA.

FAX NO. 5044683596

P.01

	
DATE <u>12/14/93</u>	
THE FOLLOWING <u>8</u> PAGE(S) IS BEING FACSIMILED.	
To: Mr. Peter J. Muller Steinke & Assoc	Facsimile Number 835-9410
FROM: Richard Korn Dravo Basic Materials Co. St. Rose, Louisiana	Facsimile Number (504) 468-3596
Comments:	
Operator's Name Confirmation Telephone Number	Melissa V. Klibert (504) 468-3347

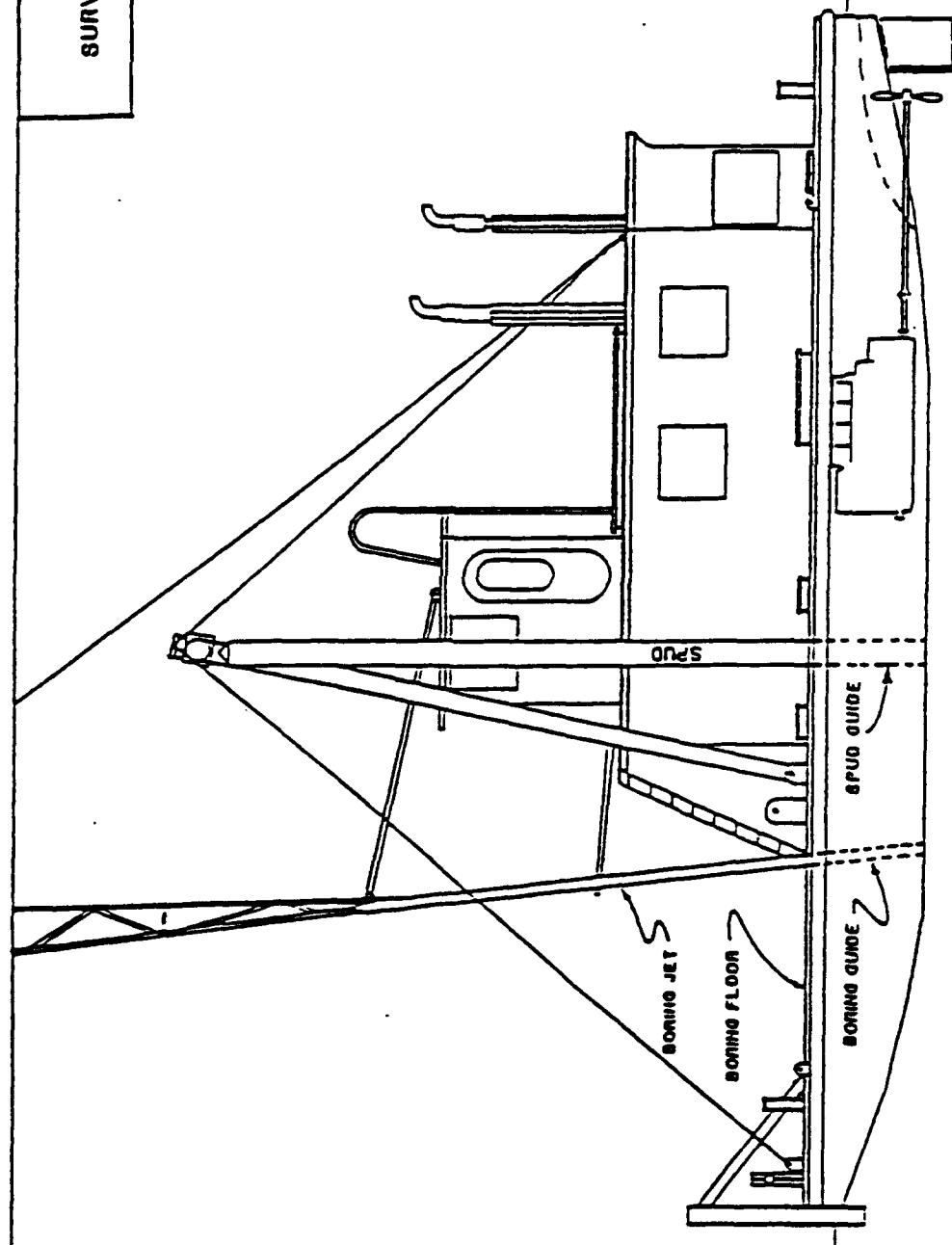
APPENDIX B

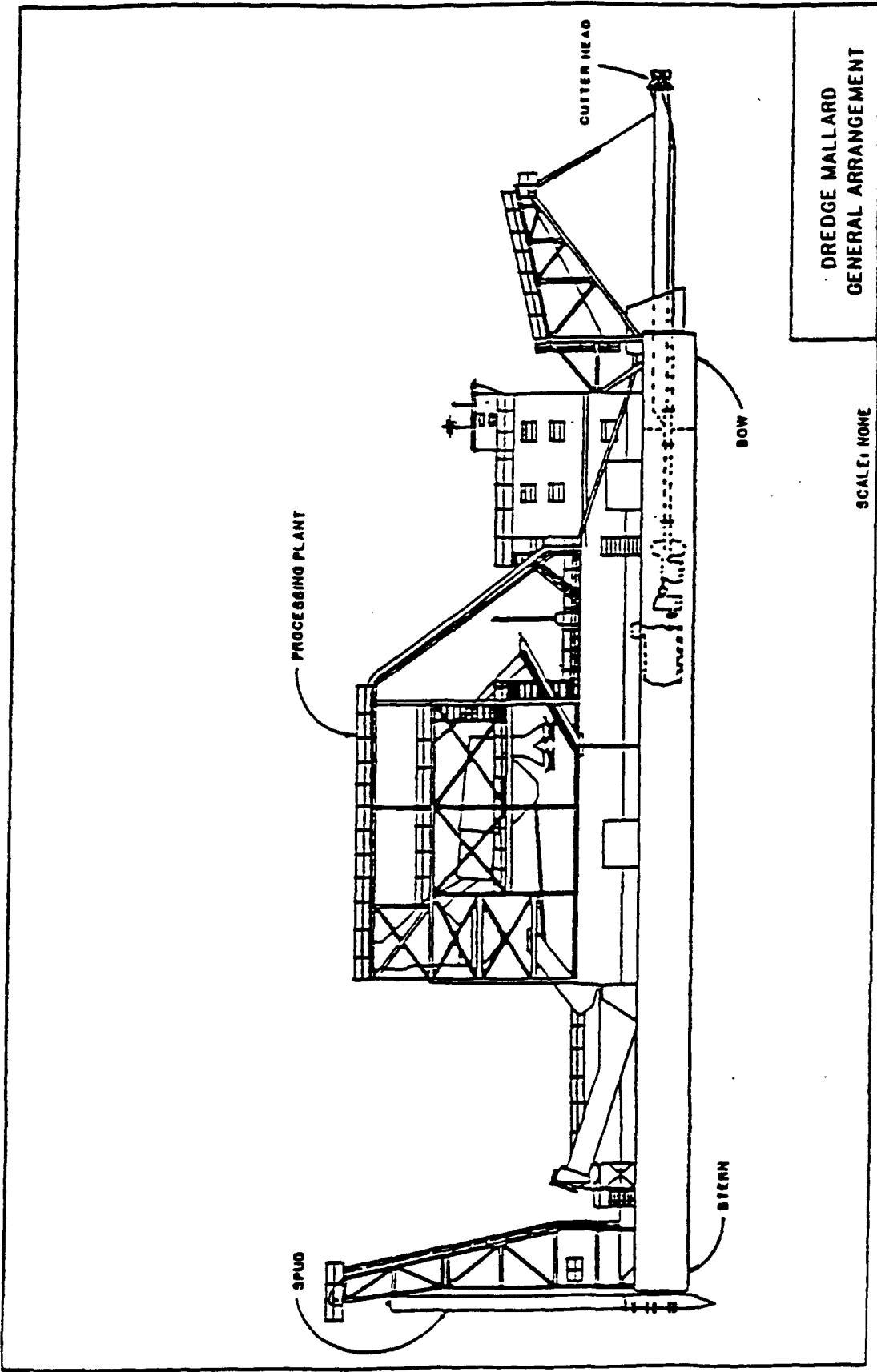
SHELL DREDGING EQUIPMENT

DRAWINGS AND SPECIFICATIONS

SURVEY BOAT PENGUIN

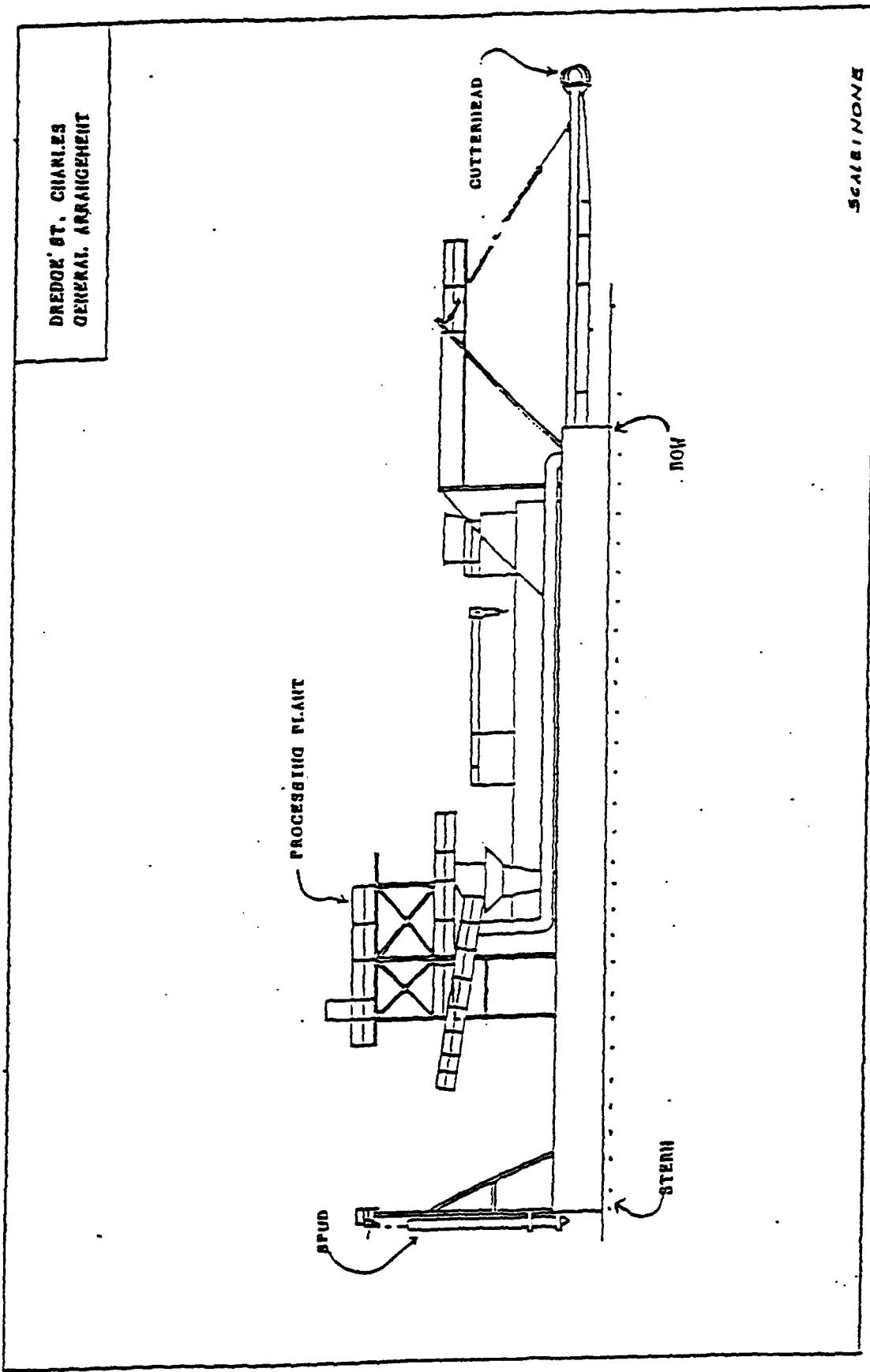
SCALE: NONE





DREDGE MALLARD
SPECIFICATIONS
COASTAL SHELL DREDGING EIS

NAME	Dredge MALLARD												
HULL	<u>Size:</u> 200' x 50' x 12' <u>Working Draft:</u> 6' <u>Overall Length:</u> 255' <u>Ladder Length:</u> 75' <u>Highest Fwd Pt. Above Light Water Line:</u> 73' <u>Slot Length:</u> 20' <u>Max. Cut Depth:</u> 54' <u>Max. Sways:</u> 420' <u>Official Number:</u> 257179 <u>Gross Tons:</u> 1,239 <u>Net Tons:</u> 1,239												
DREDGE EQUIPMENT	<u>Main Pump:</u> Mobile Pulley Works <u>Suction:</u> 22" <u>Discharge:</u> 18" <u>Rate:</u> 18,000 GPM												
	<u>Main Pump Engine:</u> CAT. Model D-358 TA <u>Horsepower:</u> 1090 HP @ 1225 RPM 16 cylinder												
	<u>Reduction Gear:</u> Lufrin, Model SV22013 <u>Ratio:</u> 3:1												
AUXILIARIES	<u>Main Generator:</u> (2) Cat. Electric Set Model D-358, A.C. 600 KW 440 volts, 3 phase												
	<u>Engine:</u> Cat. Model D-358, 12 cycle. 970 HP @ 1200 RPM												
	<u>Aux. Generators:</u> Cat. 150 KW, powered by: Cat. D-342, 300 HP Cat. Model D-342, 6 cyl.												
	<u>Screws:</u> 75' long, 35 $\frac{1}{2}$ " in dia. <u>Screw Horse:</u> 25,000 SLP 2 drum												
	<u>Hauling Gear:</u> Mobile Pulley (3 drum capacity - 30,000 SLP)												
PROCESS PLANT	<u>Wastewater Pumps:</u> Allis Chalmers Type CD 12" x 10" x 17" 5000 GPM (1) powered by: Marathon Elec. 150 HP @ 1800 RPM (2) powered by: Westinghouse, 100 HP @ 1770 RPM (3) powered by: Houston Armature Direct Drive 150 HP @ 1170 RPM												
	<u>Screens:</u> Rotary - (3) McClanahan 9'6" x 28' Outside screen: 9' x 6' Inside Screen: 6' x 6" x 29.5" <u>Coarse:</u> Gravity - (3) flashboard 8' x 16' (2) 8'10" x 20'												
	<u>Fines:</u> <u>Screw Classifiers:</u> (2) Eagle <u>Single Screen:</u> 66" x 35' <u>Conveyors:</u> <table border="0"> <tbody> <tr> <td><u>Fines Cross:</u></td> <td>36" - 36'6" c. to c.</td> </tr> <tr> <td><u>Fines Incline:</u></td> <td>36" - 92'3" c. to c.</td> </tr> <tr> <td><u>Ave. Cross:</u></td> <td>42" - 39'3" c. to c.</td> </tr> <tr> <td><u>Ave. Cross:</u></td> <td>42" - 44'1" c. to c.</td> </tr> <tr> <td><u>Locoline:</u></td> <td>42" - 50'6" c. to c.</td> </tr> </tbody> </table>			<u>Fines Cross:</u>	36" - 36'6" c. to c.	<u>Fines Incline:</u>	36" - 92'3" c. to c.	<u>Ave. Cross:</u>	42" - 39'3" c. to c.	<u>Ave. Cross:</u>	42" - 44'1" c. to c.	<u>Locoline:</u>	42" - 50'6" c. to c.
<u>Fines Cross:</u>	36" - 36'6" c. to c.												
<u>Fines Incline:</u>	36" - 92'3" c. to c.												
<u>Ave. Cross:</u>	42" - 39'3" c. to c.												
<u>Ave. Cross:</u>	42" - 44'1" c. to c.												
<u>Locoline:</u>	42" - 50'6" c. to c.												
GENERAL	<u>Waste Treatment Plant:</u> Pall Trinity Model TW600 Aerobic with Macerator & Chlorinator <u>Solid & Oil Waste:</u> Compacted, shipped ashore for disposal <u>Fuel Capacity:</u> 25,000 gal. <u>Water Capacity:</u> 54,000 gal. <u>Built:</u> 1965 <u>By:</u> (Hull) American Marine New Orleans outfitting - Lawrence Morgan City, Louisiana												



DREDGE ST. CHARLES
SPECIFICATIONS

COASTAL SHELL DREDGING VES

<u>NAME</u>	Dredge ST. CHARLES		
<u>BUILD</u>	<u>Size:</u> 185'x40'x10'	<u>Working Draft:</u> 5'	
	<u>Overall Length:</u> 250'	<u>Ladder Length:</u>	65'
	<u>Highest Fired Pt. Above Light Water Line:</u>		59'
	<u>Max. Cut Depth:</u> 46'	<u>Max. Swing:</u>	420'
	<u>Official No.:</u> 291595	<u>Gross Tons:</u>	689
		<u>Net Tons:</u>	689

DREDGE EQUIPMENT

Main Pump: Amoco #1294-15"
Suction: 20" Disch.: 16"

Main Pump Engine: (2) CAT 379 E.P.: 500 HP each &
1100 RPM each

Coupled to Main Pulley Drive by Faulk Coupling/Size 18F

AUXILIARIES

Generators: (1) 900 KW Generator - 440 - 3 Phase
Driven by CAT D398
(1) 250 KW Generator - 440 - 3 Phase
Driven by CAT D353

PROCESS PLANT

Washwater Pump: (1) Byron Jackson 4-stage
15" vertical 200 E.P.
GPM 3000 (each)
(1) Goulds Horizontal 10"x8 200 E.P.
Impeller
GPM 3000 (each)
Total: 6,000 GPM

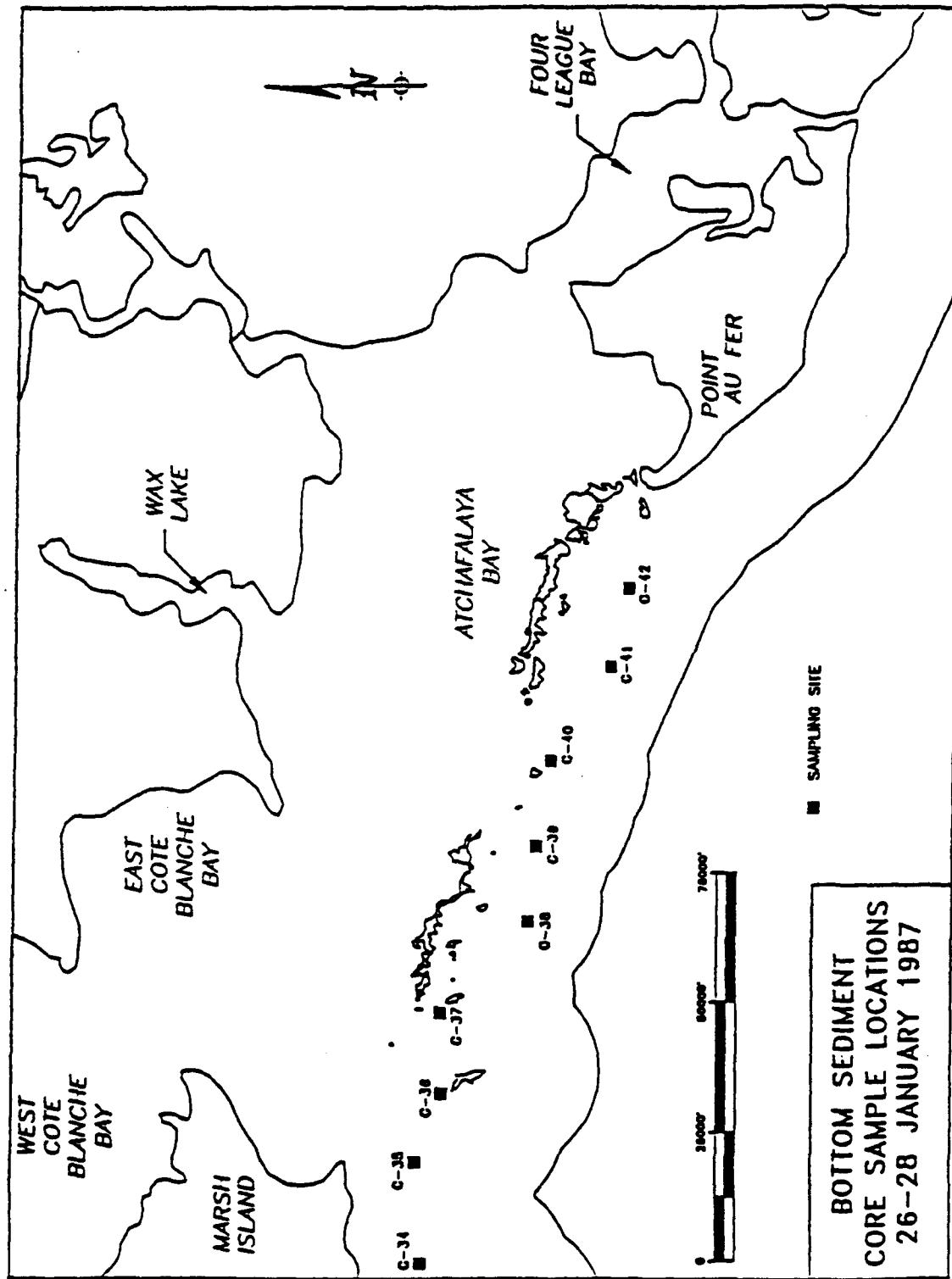
Screens & Rotary Wash: All Conveyors

GENERAL

Water Treatment Plant: Owens Clean Tank Model B
Solid & Oily Waste: Compacted, shipped ashore for
disposal
Fuel Capacity: 77,000 gal.
Water Capacity: 20,000 gal.
Built: 1963 Bv: Wiley Mfg. Co.,
Port Deposit, Maryland

APPENDIX C

**SAMPLE LOCATIONS AND
LABORATORY TEST RESULTS OF
BOTTOM SEDIMENTS SAMPLED JANUARY, 1987**

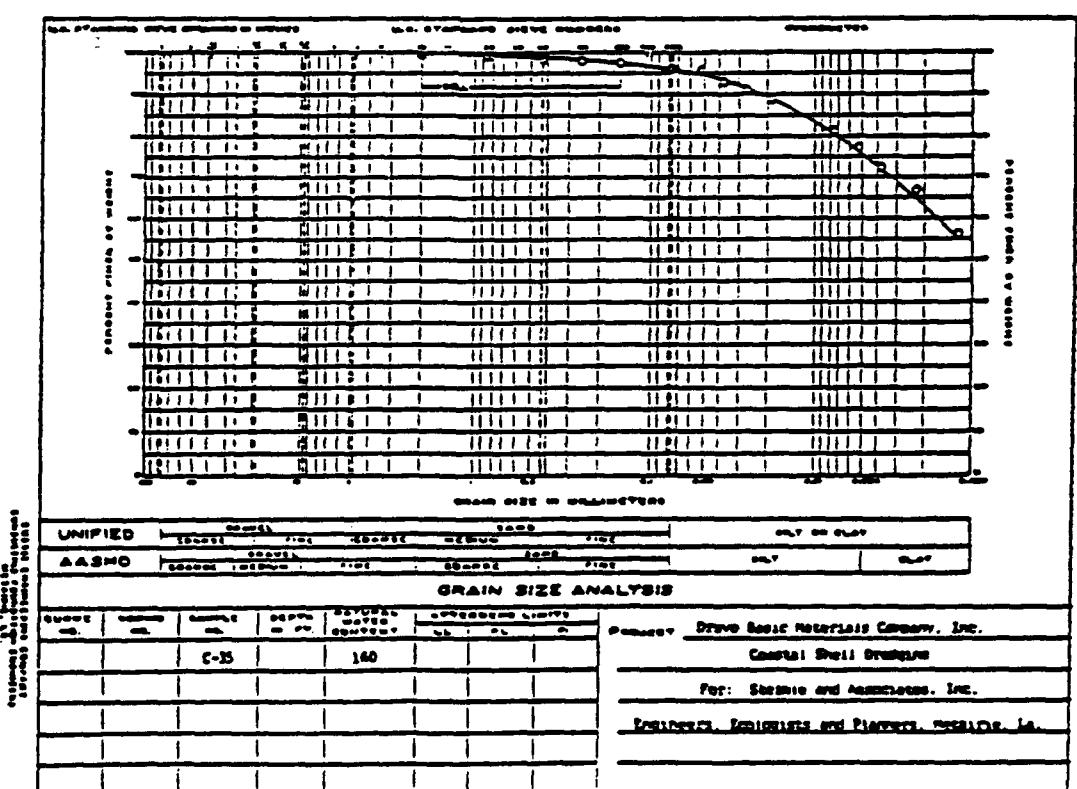
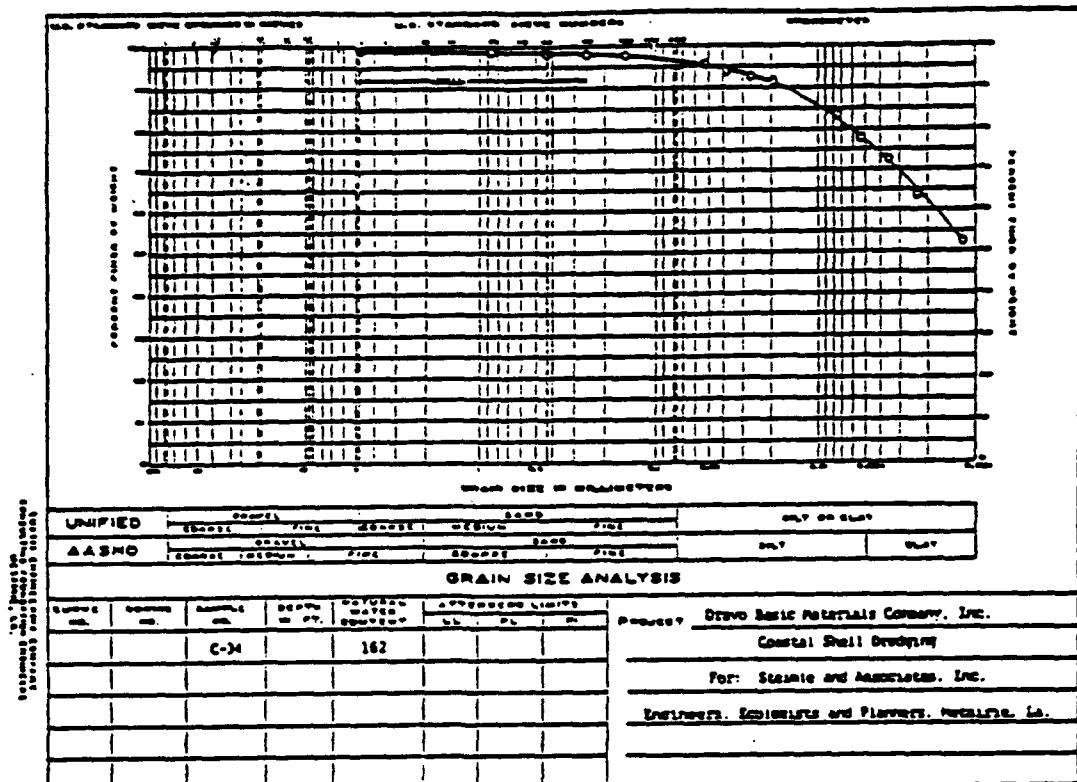


SUMMARY OF LABORATORY TEST RESULTS

<u>Sample No.</u>	<u>Date Taken</u>	<u>Classification</u>	<u>Unified Soil Classification</u>	<u>Water Contact Percent</u>	<u>Organic Percent</u>
C-35	1/29/87	Extremely soft gray & tan clay w/sand lenses & shell fragments	C	160	5.7
C-36	1/29/87	Extremely soft tan & gray clay	C	175	5.3
C-37	1/28/87	Extremely soft tan & gray clay w/sand lenses & shell fragments	C	161	4.9
C-38	1/29/87	Extremely soft tan & gray clay w/sand lenses & few shell fragments	C	155	5.2
C-39	1/29/87	Extremely soft gray & tan clay w/sand lenses & few shell fragments	C	141	4.7
C-40	1/29/87	Extremely soft dark gray clay w/sand lenses	C	101	3.9
C-41	1/28/87	Extremely soft dark gray clay w/silt layers	C	125	3.0
C-42	1/29/87	Loose tan & gray silty sand w/clay layers & shell fragments	SC	60	2.2

LABORATORY TEST RESULTS

ORAVO BASIC MATERIALS COMPANY
COASTAL SEDIL DREDGING



U.S. STANDARD GRAIN SIZE ANALYSIS

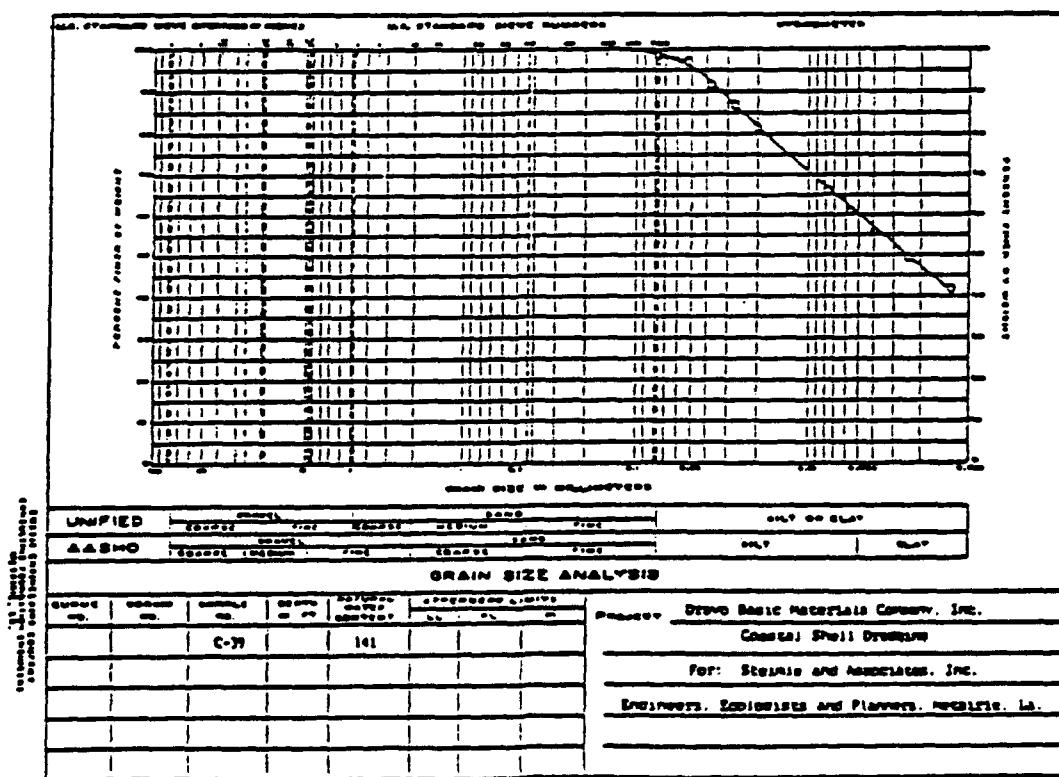
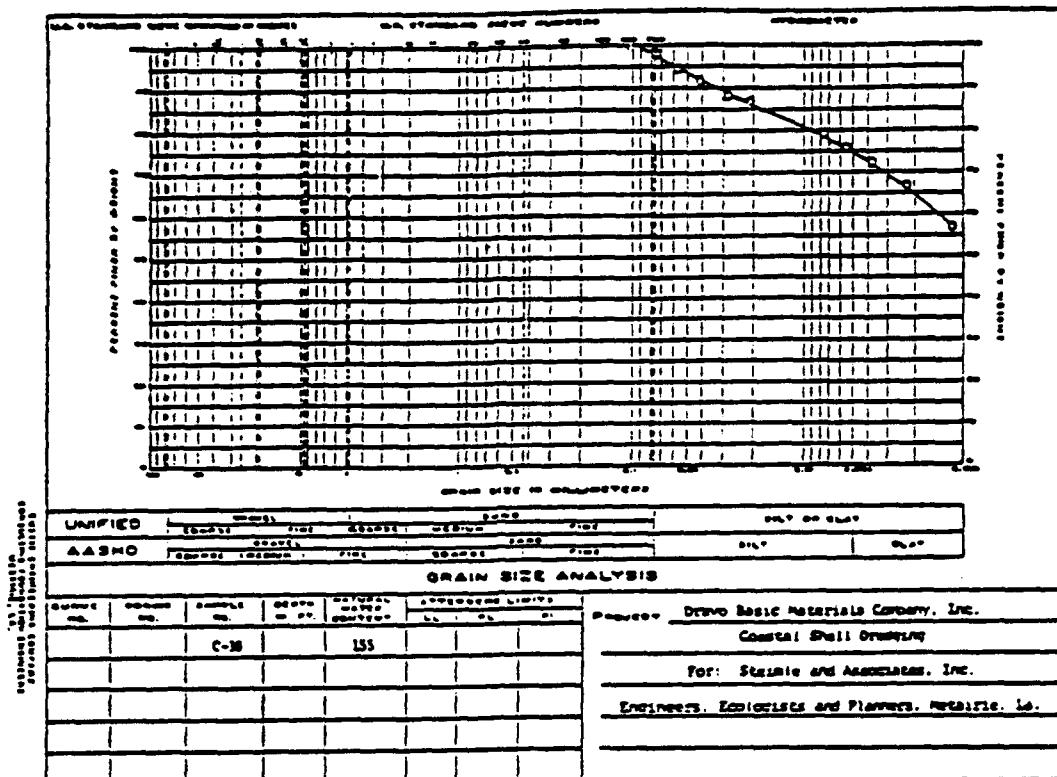
GRAIN SIZE IN MILLIMETERS

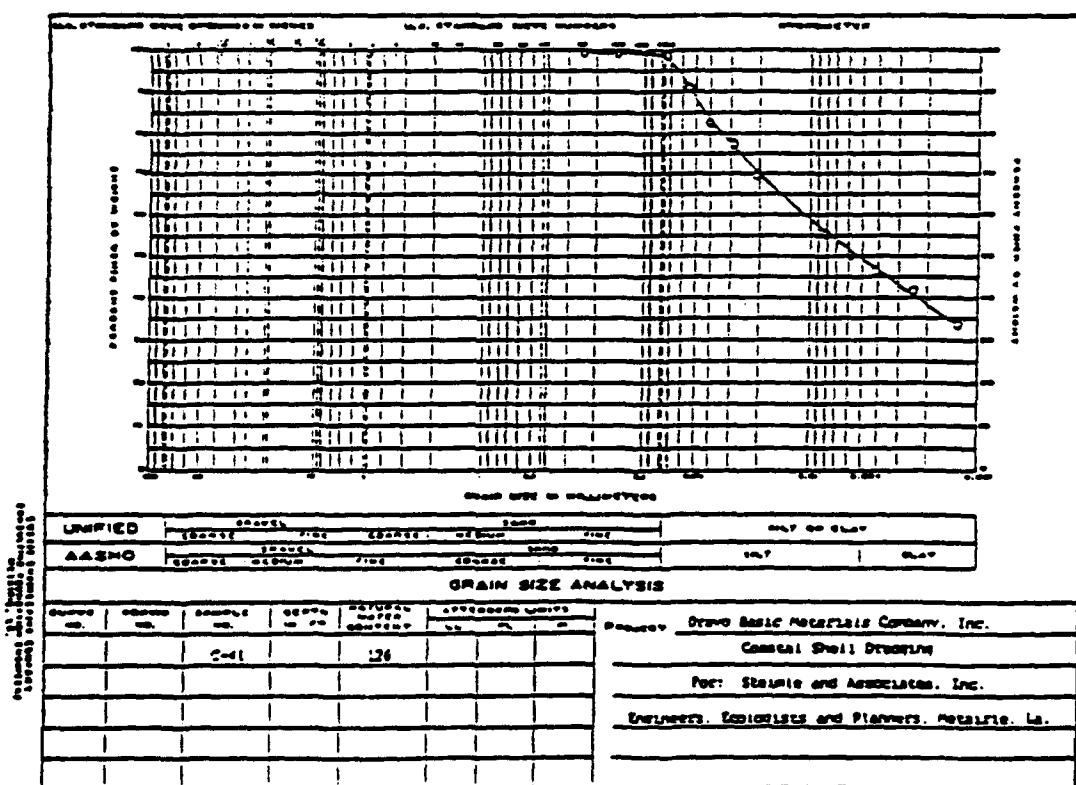
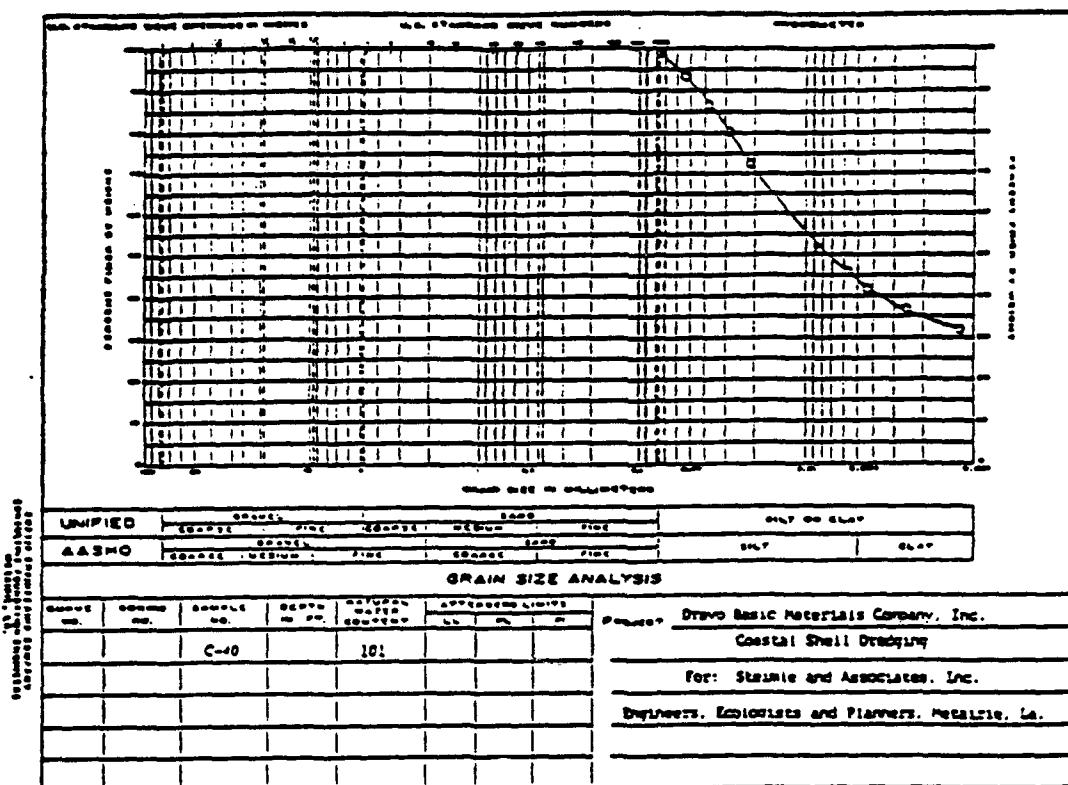
UNIFIED		AASHTO					
COARSE	FINE	COARSE	FINE	COARSE	FINE	SILT	CLAY
COARSE	FINE	COARSE	FINE	COARSE	FINE	SILT	CLAY
AASHTO	COARSE	INTERMEDIATE	FINE	COARSE	FINE		

GRAIN SIZE ANALYSIS

Diameter in mm.	Sieve Analysis		Apparatus Weight		Comments
	Passed	Retained	Weight	Time	
C-36	175				

Dravo Basic Materials Company, Inc.
Coastal Shell Dredging
For: Seminole and Associates, Inc.
Engineers, Ecologists and Planners, Metairie, La.





GRAIN SIZE OF GRANULATES

UNSPIFIED	Sample	Size	Weight	Percent	Size	Weight	Percent	GWT OR GGT		
AASHTO	GRANULES	GWT	GGT							
	GRANULES									

GRAIN SIZE ANALYSIS

Sample No.	Grain Size No.	Sample No.	Grain Size No.	Calculated Percentage Content	Apparatus Limit
C-02	60				

Product: Steve Basic Materials Company, Inc.
Coastal Shell Graveling

For: Stansbie and Associates, Inc.
Engineers, Architects and Planners, Metalite, Inc.

APPENDIX D

**FISHES FOUND IN MARSHES AND
WATER BODIES OF LOUISIANA COASTAL ZONE
(GOSSELINK, 1984; GOSSELINK ET AL., 1979)**

FISHES FOUND IN MARSHES AND WATER BODIES OF LOUISIANA COASTAL ZONE
 (Gosselink, 1984; Gosselink et al., 1979)

Species	Common Name	<u>Distribution</u>	
		CP ¹	DP ²
<i>Achirus lineatus</i>	lined sole	x	x
<i>Acipenser oxyrinchus</i>	Atlantic sturgeon	x	
<i>Adinia xenica</i>	diamond killifish		x
<i>Aetobatus narinari</i>	spotted eagle ray	x	
<i>Aleuterus schoepfi</i>	orange filefish	x	
<i>Aleuterus scriptus</i>	scrawled filefish	x	
<i>Alosa chrysocloris</i>	skipjack herring	x	x
<i>Amia calva</i>	bowfin		x
<i>Anchoa mitchilli</i>	bay anchovy	x	
<i>Anchoa hepsetus</i>	striped anchovy	x	
<i>Anchoa lyolepis</i>	dusky anchovy	x	
<i>Ancyloplitta quadrocellata</i>	ocellated flounder	x	
<i>Anguilla rostrata</i>	American eel	x	x
<i>Aphredoderus sayanus</i>	pirate perch		x
<i>Aplodinotus grunniens</i>	freshwater drum		x
<i>Aprionodon isodon</i>	finetooth shark	x	
<i>Archosargus probatocephalus</i>	sheepshead	x	x
<i>Arius felis</i>	hardhead fish	x	x
<i>Astroscopus graecum</i>	southern stargazer	x	
<i>Bagre marinus</i>	gafftopsail catfish	x	x
<i>Bairdiella chrysoura</i>	silver perch	x	x
<i>Bollmannia communis</i>	ragged goby	x	
<i>Bregmaceros atlanticus</i>	antenna codlet	x	
<i>Brevoortia gunteri</i>	finscale menhaden	x	
<i>Brevoortia patronus</i>	gulf menhaden	x	x
<i>Caranx cryos</i>	blue runner	x	x
<i>Caranx hippos</i>	crevalle jack	x	x
<i>Caranx latus</i>	horse-eye jack	x	
<i>Carcharhinus leucas</i>	bull shark	x	
<i>Carcharhinus limbatus</i>	blacktip shark	x	
<i>Carpoides carpio</i>	river carpsucker		x
<i>Centrarchus macropterus</i>	flier		x
<i>Centropristes philadelphica</i>	rock sea bass	x	x
<i>Chaetodipterus faber</i>	Atlantic spadefish	x	x
<i>Chasmodes bosquianus</i>	striped lenny	x	
<i>Chilomycterus schoepfi</i>	striped burrfish	x	
<i>Chloroscombrus chrysurus</i>	Atlanta bumper	x	x
<i>Citharichthys macrops</i>	spotted whiff	x	x
<i>Citharichthys spilopterus</i>	bay whiff	x	x
<i>Conodon nobilis</i>	barred grunt	x	
<i>Coryphaena hippurus</i>	dolphin	x	x
<i>Cynoscion arenarius</i>	sand seatrout	x	x
<i>Cynoscion nebulosus</i>	spotted seatrout	x	x
<i>Cynoscion nothus</i>	silver seatrout	x	x
<i>Cyprinodon variegatus</i>	sheepshead minnow	x	x
<i>Cyprinus carpio</i>	carp		x

FISHES FOUND IN MARSHES AND WATER BODIES OF LOUISIANA COASTAL ZONE
 (Gosselink, 1984; Gosselink et al., 1979)

Species	Common Name	Distribution	
		CP ¹	DP ²
<i>Cypselurus exsiliens</i>	bandwing flyingfish	x	
<i>Cypselurus furcatus</i>	spotfin flyingfish	x	
<i>Dasyatis americana</i>	southern stingray	x	
<i>Diodon hystrix</i>	porcupinefish	x	
<i>Dasyatis sayi</i>	bluntnose stingray	x	
<i>Dasyatis sabina</i>	Atlantic stingray	x	x
<i>Dormitator maculatus</i>	fat sleeper		x
<i>Dorosoma cepedianum</i>	gizzard shad	x	x
<i>Dorosoma petenense</i>	threadfin shad	x	
<i>Echeneis naucrates</i>	sharksucker	x	
<i>Elassoma zonatum</i>	banded pygmy sunfish		x
<i>Eleotris pisonis</i>	spinycheek sleeper		x
<i>Elops saurus</i>	ladyfish	x	x
<i>Erimyzon oblongus</i>	creek chubsucker		x
<i>Esox americanus vermiculatus</i>	grass pickerel		x
<i>Etheostoma chlorosomum</i>	bluntnose darter		x
<i>Etheostoma gracile</i>	slough darter		x
<i>Etheostoma proeliare</i>	cypress darter		x
<i>Etropus crossotus</i>	fringed flounder	x	x
<i>Eucinostomus argenteus</i>	spotfin mojarra	x	x
<i>Evorthodus lyricus</i>	lyre goby		x
<i>Fundulus chrysotus</i>	golden topminnow		x
<i>Fundulus grandis</i>	gulf killifish		x
<i>Fundulus jenkinsi</i>	saltmarsh topminnow		x
<i>Fundulus olivaceus</i>	blackspotted topminnow		x
<i>Fundulus pulvereus</i>	bayou killifish		x
<i>Fundulus similis</i>	longnose killifish	x	x
<i>Fundulus notti</i>	starhead topminnow		x
<i>Gambusia affinis</i>	mosquitofish	x	x
<i>Gobiesox strumosus</i>	skilletfish	x	x
<i>Gobioctides broussoneti</i>	violet goby	x	x
<i>Gobionellus boleosoma</i>	darter goby	x	x
<i>Gobionellus hastatus</i>	sharptail goby		x
<i>Gobionellus shufeldti</i>	freshwater goby		x
<i>Gobiosoma boscii</i>	naked goby	x	x
<i>Gobiosoma robustum</i>	code goby		x
<i>Gymnura micrura</i>	smooth butterfly ray	x	
<i>Gymnachirus lexae</i>	fringed sole	x	
<i>Gymnothorax moringua</i>	spotted moray	x	
<i>Harengula pensacolae</i>	scaled sardine	x	
<i>Heterandria formosa</i>	least killifish		x
<i>Histrio histrio</i>	sargassumfish	x	
<i>Hyporhamphus unifasciatus</i>	halfbeak	x	x
<i>Hypsoblennius hentzi</i>	feather blenny	x	
<i>Hypsoblennius ionthas</i>	freckled blenny	x	

FISHES FOUND IN MARSHES AND WATER BODIES OF LOUISIANA COASTAL ZONE
 (Gosselink, 1984; Gosselink et al., 1979)

Species	Common Name	Distribution	
		CP ¹	DP ²
<i>Ictalurus furcatus</i>	blue catfish		x
<i>Ictalurus melas</i>	black bullhead		x
<i>Ictalurus natalis</i>	yellow bullhead		x
<i>Ictalurus punctatus</i>	channel catfish		x
<i>Ictiobus bubalus</i>	smallmouth buffalo		x
<i>Ictiobus cyprinellus</i>	bigmouth buffalo		x
<i>Labidesthes sicculus</i>	brook silverside		x
<i>Lactophrys quadricornis</i>	scrawled cowfish	x	
<i>Lagocephalus laevigatus</i>	smooth puffer	x	x
<i>Lagodon rhomboides</i>	pinfish	x	x
<i>Lapomis marginatus</i>	dollar sunfish		x
<i>Larimus faciatus</i>	banded drum	x	
<i>Leiostomus xanthurus</i>	spot	x	x
<i>Lepisosteus oculatus</i>	spotted gar		x
<i>Lepisosteus osseus</i>	longnose gar	x	
<i>Lepisosteus spatula</i>	alligator gar	x	x
<i>Lepomis cyanellus</i>	green sunfish		x
<i>Lepomis gulosus</i>	warmouth		x
<i>Lepomis macrochirus</i>	bluegill		x
<i>Lepomis megalotis</i>	longear sunfish		x
<i>Lepomis microlophus</i>	redear sunfish		x
<i>Lepomis punctatus</i>	spotted sunfish		x
<i>Lepomis symmetricus</i>	bantam sunfish		x
<i>Lobotes surinamensis</i>	tripletail	x	x
<i>Lucania parva</i>	rainwater killifish		x
<i>Lutjanus griseus</i>	gray snapper	x	x
<i>Lutjanus synagris</i>	Lane snapper	x	x
<i>Manta birostris</i>	Atlantic manta	x	
<i>Maracouger caudilimbatus</i>	margintail conger	x	
<i>Megalops atlanticus</i>	tarpon	x	
<i>Membras martinica</i>	rough silverside		x
<i>Menidia beryllina</i>	inland silverside	x	x
<i>Menticirrhus littoralis</i>	Gulf kingfish	x	
<i>Menticirrhus americanus</i>	southern kingfish	x	
<i>Microdesmus longipinnis</i>	pink wormfish	x	
<i>Microgobius thalassinus</i>	green goby		x
<i>Microgobius gulosus</i>	clown goby		x
<i>Micropogonias undulatus</i>	Atlantic croaker	x	x
<i>Micropterus salmoides</i>	largemouth bass		x
<i>Minytrema melanops</i>	spotted sucker		x
<i>Monacanthus lispinus</i>	planehead filefish		x
<i>Morone chrysops</i>	white bass		x
<i>Morone mississippiensis</i>	yellow bass		x
<i>Morone saxatilis</i>	striped bas	x	x
<i>Moxostoma poecilurum</i>	blacktail redhorse		x

FISHES FOUND IN MARSHES AND WATER BODIES OF LOUISIANA COASTAL ZONE
 (Gosselink, 1984; Gosselink et al., 1979)

Species	Common Name	<u>Distribution</u>	
		CP ¹	DP ²
<i>Mugil cephalus</i>	striped mullet	x	x
<i>Mugil curema</i>	white mullet	x	
<i>Myrophis punctatus</i>	speckled worm eel	x	
<i>Mystriophis mordax</i>	snapper eel	x	
<i>Mystriophis intertinctus</i>	spotted spoon-nose eel	x	
<i>Narcine brasiliensis</i>	lesser electric ray	x	
<i>Negaprion brevirostris</i>	lemon shark	x	
<i>Notemigonus crysoleucas</i>	golden shiner		x
<i>Notropis atherinoides</i>	emerald shiner		x
<i>Notropis buchanani</i>	ghost shiner		x
<i>Notropis emiliae</i>	pugnose minnow		x
<i>Notropis fumeus</i>	ribbon shiner		x
<i>Noturus gyrinus</i>	tadpole madtom		x
<i>Notropis lutrensis</i>	red shiner		x
<i>Notropis maculatus</i>	taillight shiner		x
<i>Notropis sabinae</i>	Sabine shiner		x
<i>Notropis texanus</i>	weed shiner		x
<i>Notropis volucellus</i>	mimic shiner		x
<i>Ogcocephalus radiatus</i>	polka-dot batfish	x	
<i>Oligoplites saurus</i>	leatherjacket	x	x
<i>Ophichthus gomesi</i>	shrimp eel	x	
<i>Ophidion welshi</i>	crested cusk-eel	x	x
<i>Opisthonema oglinum</i>	Atlantic thread herring	x	
<i>Opsanus beta</i>	gulf toadfish	x	x
<i>Orthopristis chrysoptera</i>	pigfish	x	
<i>Paralichthys alboguttata</i>	Gulf flounder	x	x
<i>Paralichthys lethostigma</i>	southern flounder	x	x
<i>Paralichthys squamiventris</i>	broad flounder	x	
<i>Pepriodus alepidotus</i>	harvest fish	x	x
<i>Pepriodus burti</i> Fowler	Gulf butterfish	x	x
<i>Pimephales vigilax</i>	bullhead minnow		x
<i>Poecilia latipinna</i>	sailfin molly	x	x
<i>Pogonias cromis</i>	black drum	x	x
<i>Polydactylus octonemus</i>	Atlantic threadfin	x	x
<i>Pomatomus saltatrix</i>	bluefish	x	x
<i>Pomoxis annularis</i>	white crappie		x
<i>Pomoxis nigromaculatus</i>	black crappie		x
<i>Porichthys porosissimus</i>	Atlantic midshipman	x	
<i>Prionotus marlisis</i>	barred searobin	x	
<i>Prionotus rubio</i>	blackfin searobin	x	
<i>Prionotus scitulus</i>	leopard searobin	x	
<i>Prionotus tribulus</i>	bighead searobin	x	
<i>Pristis pectinata</i>	smalltooth sawfish	x	
<i>Pristis perotteti</i>	largetooth sawfish	x	
<i>Pylodictis olivaris</i>	flathead catfish		x

FISHES FOUND IN MARSHES AND WATER BODIES OF LOUISIANA COASTAL ZONE
 (Gosselink, 1984; Gosselink et al., 1979)

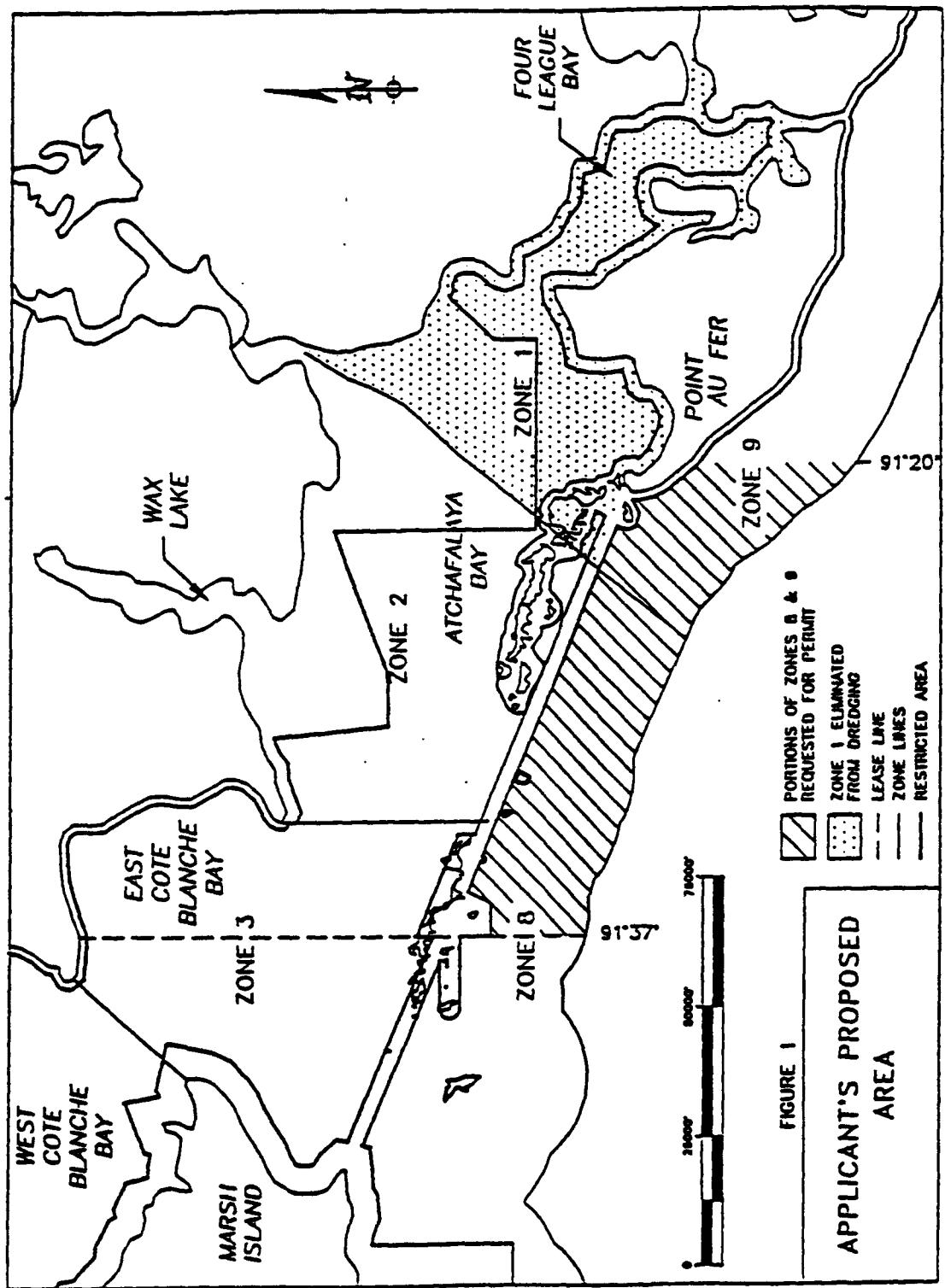
Species	Common Name	<u>Distribution</u>
		CP ¹ DP ²
<i>Rachycentron canadum</i>	cobia	x x
<i>Raja texana</i>	roundel skate	x
<i>Remora remora</i>	remora	x
<i>Rhinobatos lentiginosus</i>	Atlantic guitarfish	x
<i>Rhinophtera bonasus</i>	cownose ray	x
<i>Rhizoprionodon terranovae</i>	Atlantic sharpnose shark	x x
<i>Sciaenops ocellatus</i>	red drum	x x
<i>Scomberomorus maculatus</i>	spanish mackerel	x x
<i>Scorpaena calcarata</i>	smoothhead scorpionfish	x
<i>Selena vomer</i>	lookdown	x x
<i>Serranus subligarius</i>	belted sandfish	x
<i>Sphoeroides parvus</i>	least puffer	x x
<i>Sphyraena barracuda</i>	great barracuda	x x
<i>Sphyrana tiburo</i>	bonnethead	x
<i>Sphyrana tudes</i>	smalleye hammerhead	x
<i>Stellifer lanceolatus</i>	star drum	x x
<i>Stenotomus caprinus</i>	Longspine porgy	x
<i>Strongylura marina</i>	Atlantic needlefish	x x
<i>Syacium gunteri</i>	shoal flounder	x
<i>Syphurus parvus</i>	pygmy tonguefish	x
<i>Syphurus plagiura</i>	blackcheek tonguefish	x x
<i>Syphurus diomedianus</i>	spottedfin tonguefish	x
<i>Syngnathus louisianae</i>	chain pipefish	x x
<i>Syngnathus scovelli</i>	gulf pipefish	x x
<i>Synodus foetens</i>	inshore lizardfish	x x
<i>Trachinotus carolinus</i>	Florida pompano	x x
<i>Trachinotus falcatus</i>	permit	x x
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	x
<i>Trinectes maculatus</i>	hogchoker	x x
<i>Urophysis floridanus</i>	southern hake	x
<i>Vomer setapinnis</i>	Atlantic moonfish	x

CP = Chenier plain

DP = Mississippi deltaic plain

APPENDIX E

**ASSESSMENT OF PROJECT IMPACTS ON
ENDANGERED SPECIES**





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9450 Koger Boulevard
St. Petersburg, FL 33702

March 15, 1993 F/SEO13:JEB

Mr. Robert Bosenberg
Planning Division
New Orleans District
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Mr. Bosenberg:

We received your memorandum reinitiating Endangered Species Act Section 7 consultation for a proposed shelldredging project to be carried out in the nearshore area of the Gulf of Mexico between Marsh Island and Point au Fer Island, Louisiana. The reinitiation is necessary because a new species, the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), has been listed in the general area of the project.

We have reviewed the information provided in your March 12, 1993 memorandum and concur with your determination that the Gulf sturgeon would not be affected by this project. This determination is based on the fact that the Gulf sturgeon is not known to occur west of the Mississippi River delta and the project area is approximately 120 west of the delta.

This concludes consultation responsibilities under Section 7 of the ESA. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified, or critical habitat is determined that may be affected by the proposed activity.

If you have any questions please contact Jeffrey Brown, Fishery Biologist, at (813) 893-3366.

Sincerely,

Charles Oravetz, Chief
Protected Species Management
Branch

cc: F/PR2
F/SER2



MEMO

TO: Project File

CC: Ms. Terry Rabot (US Fish and Wildlife Service)

Mr. Jeff Brown (National Marine Fisheries Service)

Mr. John Weber (Corps of Engineers, New Orleans District)

FROM: R. Bosenberg (Corps of Engineers, New Orleans District) *(f/b)*

SUBJ: Endangered/Threatened Species Act - Informal Section 7
Consultation

SPECIFICATION: The Gulf Sturgeon and Shelldredging

DATE: March 10, 1993

1. On this date I spoke by telephone with Ms. Rabot and Mr. Brown. The purpose for my conversations was to fulfill the District's endangered and threatened species obligations.

2. In August of 1991, DRAVO, permit applicant at that time, requested that processing of the permit request and work on the accompanying draft EIS be suspended. In February of 1993, Louisiana Dredging Company, an affiliate of DRAVO, filed an updated permit application. The District resumed permit processing which includes resumption of the EIS process. During the nearly two year interim period, the Gulf sturgeon was listed as a threatened species.

3. The currently proposed activity is in all other matters identical with the action proposed previously by DRAVO and addressed in the earlier informal consultation process. Thus, at this time the District need only conduct consultation regarding the Gulf sturgeon.

4. The Gulf sturgeon is known to occur easterly from the Mississippi River. In Louisiana, the species is associated with Lake Pontchartrain and its tributary rivers.

5. The proposed shelldredging project site is over 100 miles westerly (i.e., nearshore Gulf of Mexico waters between Marsh Island and Point au Fer Island, see attached map). What'smore, the sturgeon is not recorded to occur in the proposed project area. This does not mean that the species could not occur in the project area. However, the District does conclude that the proposed project is not likely to adversely affect the Gulf sturgeon.

6. The District's conclusion and the basis for it were conveyed to Ms. Rabot and Mr. Brown during the subject telephone conversation. They fully concurred with the District's conclusion.

7. This memo shall serve as the record of that conversation and written confirmation of their concurrence. By mutual consent, further consultation is not needed.

8. A copy of this memo shall be included in the DEIS.



STEIMLE & ASSOCIATES, INC.

ENGINEERS, ECOLOGISTS, PLANNERS • SPECIALIZING IN THE ENVIRONMENT

P. O. BOX 845 • METAIRIE, LOUISIANA 70004 • (504) 831-2574

March 8, 1990

Mr. Robert Bowker
Field Supervisor
U.S. Fish and Wildlife Service
Jackson Mall Office Center
300 Woodrow Wilson Avenue, Suite 316
Jackson, Mississippi 39213

Dear Mr. Bowker:

We are collecting data for the New Orleans District Corps of Engineers Planning Division concerning listed and proposed threatened an/or endangered species which may be impacted by extension of Section 10 and Section 404 permits to dredge shells in the Gulf Coast Area (GCA). The GCA consists of Vermilion Bay, West Cote Blanche Bay, and a narrow margin along the shore of the Gulf of Mexico ranging roughly from south of White Lake to Isle Dernieres (Figure 1). This is an extension of the recently permitted area of Atchafalaya, Four League and East Cote Blanche Bays. Although clam shells (Rangia) occur in the GCA, only oyster shells are currently dredged.

As in the eastern area, the oyster shell deposits are found in reefs, with millions of cubic yards of shell more or less cemented together. The fossil shells are buried under 4 to 8 feet of silty clay. These accumulations of fossil shells are dredged as a local source of calcium carbonate and aggregate. The type of dredge used is barge-like in design, with an excavating cutterhead, a suction ladder, a pumping system, and a materials washing and screening plant. Shell recovery is accomplished by hydraulic suction. As the cutterhead digs through the shell deposit, it moves forward by hauling in on anchor cables, causing the dredge to swing from side to side, pivoting on one of its spuds. A matrix of mud and shell enters through the cutterhead, and is pumped over a series of sizing screens and rotary washers. As the dredge pivots, the dredged material is directed back into the dredge area through a submerged discharge pipe. Most of the discharge resettles in the area of the slow-moving dredge, and the resulting bottom configuration, just after dredging, is a series of shallow troughs and mounds.

S STEIMLE & ASSOCIATES, INC.

Mr. Robert Bowker
Field Supervisor
U.S. Fish and Wildlife Service
March 8, 1990
Page 2

The oyster shells are used in the manufacture of cement, glass, chemicals, pharmaceuticals, wallboard, chicken and cattle feed, and agricultural lime. They are also used for road construction and in water purification systems.

If you have any questions concerning the matter, please contact

Sincerely,

STEIMLE & ASSOCIATES, INC.

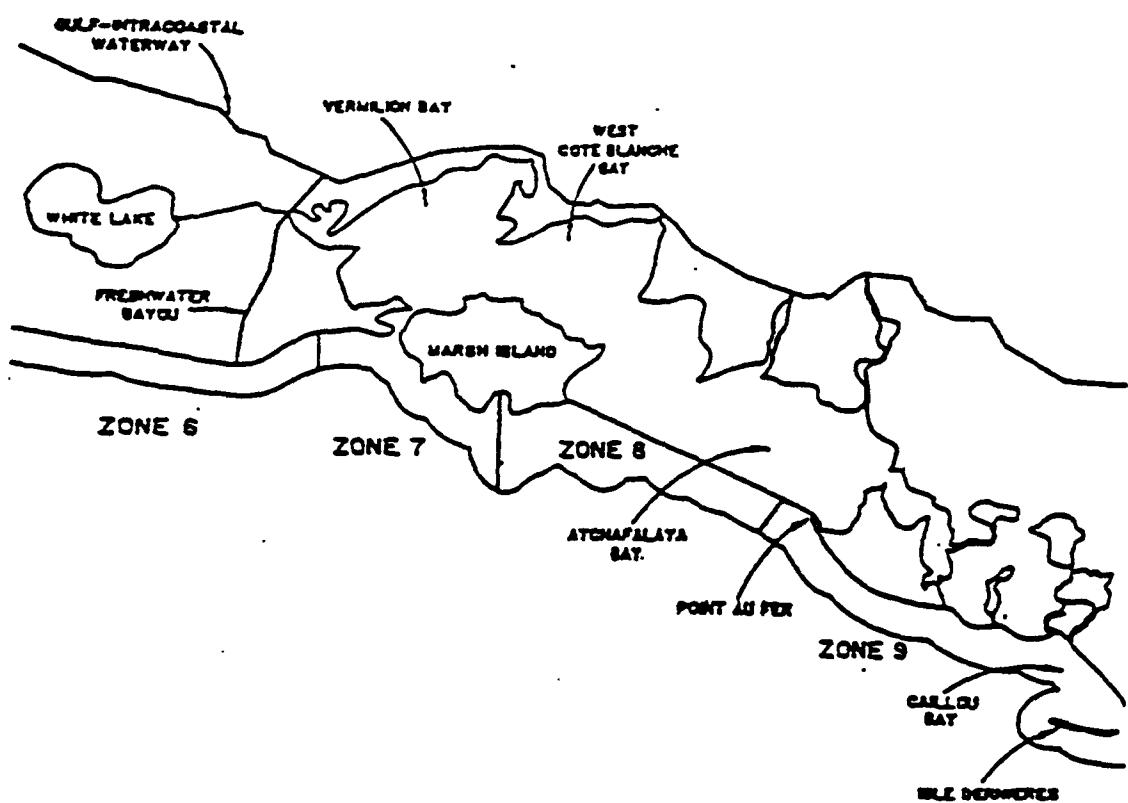
Maureen M. Mulino

Maureen M. Mulino, Ph.D.
Vice President

MMM:kma
8617506a

Enclosure

FIGURE 1





United States Department of the Interior

825 Kaliste Saloom Rd.
Brandywine Bldg. II, Suite 102
Lafayette, Louisiana 70508



April 12, 1990

Maureen M. Mulino, Ph.D.
Steimle and Associates, Inc.
Post Office Box 865
Metairie, Louisiana 70004

Dear Dr. Mulino:

Reference is made to your March 8, 1990, letter in which you requested information concerning listed and proposed threatened or endangered species that may be impacted by extension of Section 10 and Section 404 permits to dredge shells in the Gulf Coast Area. This Area includes Vermillion Bay, West Cote Blanche Bay, and a narrow margin of the Gulf of Mexico shoreline from White Lake to Isles Dernieres in Louisiana. The following comments are provided in accordance with provisions of the Endangered Species Act of 1973 (as amended).

Endangered brown pelicans nest in the project area on Isles Dernieres and feed in the project area. Nests are usually built in mangrove trees or other shrubby vegetation, but ground nesting does occur. Brown pelicans feed in shallow estuarine waters, with sand spits and offshore sand bars used as resting and roost areas.

The piping plover and Arctic peregrine falcon are threatened species that winter in coastal areas of Louisiana. Piping plovers feed on mudflats and beaches. Peregrine falcons feed throughout coastal marshes and along the Gulf shoreline.

Threatened or endangered sea turtles and marine mammals are also present in Louisiana coastal waters. For information concerning those species, please contact the National Marine Fisheries Service in St. Petersburg, Florida (Phone 813/893-3366).

If the proposed action is a major Federal action (i.e., requires an Environmental Impact Statement), then a biological assessment must also be prepared in accordance with Section 7(c) of the Endangered Species Act, to determine the effects of the proposed action on the above-listed species. Preparation of the biological assessment is the responsibility of the Corps of Engineers, although Steimle and Associates, Inc., as representatives of the Corps may prepare the document. The biological assessment should be completed within 180 days after the date of this letter and submitted to this office before any work on the proposed project has been initiated. Biological assessments must include:

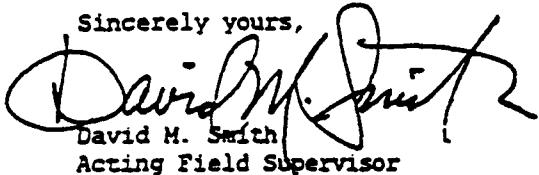
1. a scientifically sound on-site inspection of the study area to determine if the listed species are present;

2. interviews with recognized experts on the listed species, including the Service, state conservation agencies, universities, etc.;
3. literature reviews or other scientific information to determine species distribution, habitat needs, and other biological requirements;
4. analysis of the impacts (including cumulative impacts) of the proposed work on individuals and populations of each listed species and its habitat;
5. analysis of the effects that each alternative plan would have on the listed species.

If it is determined that the proposed work may affect any of the listed species, the Corps of Engineers must request, in writing, a formal consultation from this office pursuant to Section 7(a) of the Endangered Species Act. A request to initiate formal consultation can accompany submission of the biological assessment to the Fish and Wildlife Service.

If you need further information, including a list of recognized experts for the listed species, please contact Kim Mitchell of this office.

Sincerely yours,



A handwritten signature in black ink, appearing to read "David M. Smith".

David M. Smith
Acting Field Supervisor

KMM/pl

cc: Fish and Wildlife Service, Atlanta, GA (AWE)
Fish and Wildlife Service, Washington, D.C.
Corps of Engineers New Orleans District, New Orleans, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA



STEIMLE & ASSOCIATES, INC.

ENGINEERS, ECOLOGISTS, PLANNERS • SPECIALIZING IN THE ENVIRONMENT

P. O. BOX 868 • METAIRIE, LOUISIANA 70004 • (504) 831-2374

October 18, 1990

Mr. David M. Smith
Acting Field Supervisor
U.S. Fish and Wildlife Service
825 Kaliste Saloom Rd.
Brandywine Bldg. II, Suite 102
Lafayette, LA 70508

Dear Mr. Smith:

By letter of March 8, 1990, we explained to you that we were collecting data for the New Orleans Corps of Engineers Planning Division regarding threatened and/or endangered species which may be impacted by Section 10 and Section 404 permits to dredge reef shell in the Gulf Coast Area. We have completed the assessment which addressed the species listed in your reply of April 12, 1990, and that assessment is enclosed.

You will note that the area in which the permit is being sought is different from that described in the March 9, 1990 letter. The permit application is now for a modification of the existing permit to dredge shell in Atchafalaya and Four League Bays. This modification will request an area of the Gulf of Mexico adjacent to Atchafalaya Bay between West Longitude 91° 37' and 91° 20' and out three miles into the Gulf of Mexico. Additionally, no dredging will be done in Four League Bay which will be removed from the permitted area.

The rare and endangered species assessment which is enclosed has also been submitted to the New Orleans District Corps of Engineers Planning Division and the National Marine Fisheries Service. The assessment will be incorporated into the Environmental Impact Statement for which we are currently gathering data on that area of the Gulf of Mexico for which permits are being sought.

S STEIMLE & ASSOCIATES INC.

Mr. David M. Smith
U.S. Fish and Wildlife Service
October 18, 1990
Page 2

If you have any questions, please do not hesitate to call.

Sincerely,

STEIMLE & ASSOCIATES, INC.

Maureen M. Mulino

Maureen M. Mulino, Ph.D.
Vice President

MMM:bbd
8617506b

Enclosures

cc: Mr. David Reece, U.S. Army Corps of Engineers,
New Orleans District w/o enclosures
Mr. Don Palmore, DRAVO w/o enclosures



United States Department of the Interior

FISH AND WILDLIFE SERVICE

825 Kaliste Saloom Road
Brandywine Bldg. II, Suite 102
Lafayette, Louisiana 70508



October 29, 1990

Ms. Maureen M. Mulino
Steimle & Asso., Inc.
P. O. Box 865
Metairie, LA 70004

Dear Ms. Mulino:

This letter is written in response to your October 18, 1990, letter and attached Biological Assessment regarding impacts to threatened or endangered species that would result from oyster shell dredging along the Central Louisiana Gulf Coast. The specific proposed work area is adjacent to Atchafalaya Bay between west longitude 91° 37' and 91° 20' and from shoreline out to 3 miles into the Gulf of Mexico. The following comments are provided in accordance with the Endangered Species Act of 1973 (as amended).

We concur with your finding that the proposed activity is not likely to adversely affect brown pelicans, Arctic peregrine falcons, and piping plovers. If you anticipate any changes in the scope or location of this project, please contact Kim Mitchell of this office for further coordination.

Sincerely yours,

David W. Frugé
Field Supervisor

KMM/sav



STEIMLE & ASSOCIATES, INC.
ENGINEERS, ECOLOGISTS, PLANNERS • SPECIALIZING IN THE ENVIRONMENT

P. O. BOX 865 • METAIRIE, LOUISIANA 70004 • (504) 831-2574

March 8, 1990

Dr. Terry Henwood
National Marine Fisheries Service
U.S. Department of Commerce
9450 Koger Blvd.
St. Petersburg, Florida 33702

Dear Dr. Henwood:

We are collecting data for the New Orleans District Corps of Engineers Planning Division concerning listed and proposed threatened an/or endangered species which may be impacted by extension of Section 10 and Section 404 permits to dredge shells in the Gulf Coast Area (GCA). The GCA consists of Vermilion Bay, West Cote Blanche Bay, and a narrow margin along the shore of the Gulf of Mexico ranging roughly from south of White Lake to Isle Dernieres (Figure 1). This is an extension of the recently permitted area of Atchafalaya, Four League and East Cote Blanche Bays. Although clam shells (Rangia) occur in the GCA, only oyster shells are currently dredged.

As in the eastern area, the oyster shell deposits are found in reefs, with millions of cubic yards of shell more or less cemented together. The fossil shells are buried under 4 to 8 feet of silty clay. These accumulations of fossil shells are dredged as a local source of calcium carbonate and aggregate. The type of dredge used is barge-like in design, with an excavating cutterhead, a suction ladder, a pumping system, and a materials washing and screening plant. Shell recovery is accomplished by hydraulic suction. As the cutterhead digs through the shell deposit, it moves forward by hauling in on anchor cables, causing the dredge to swing from side to side, pivoting on one of its spuds. A matrix of mud and shell enters through the cutterhead, and is pumped over a series of sizing screens and rotary washers. As the dredge pivots, the dredged material is directed back into the dredge area through a submerged discharge pipe. Most of the discharge resettles in the area of the slow-moving dredge, and the resulting bottom configuration, just after dredging, is a series of shallow troughs and mounds.

S STEIMLE & ASSOCIATES, INC.

Dr. Terry Henwood
U.S. Department of Commerce
March 8, 1990
Page 2

The oyster shells are used in the manufacture of cement, glass, chemicals, pharmaceuticals, wallboard, chicken and cattle feed, and agricultural lime. They are also used for road construction and in water purification systems.

If you have any questions concerning the matter, please contact

Sincerely,

STEIMLE & ASSOCIATES, INC.

Maureen M. Mulino

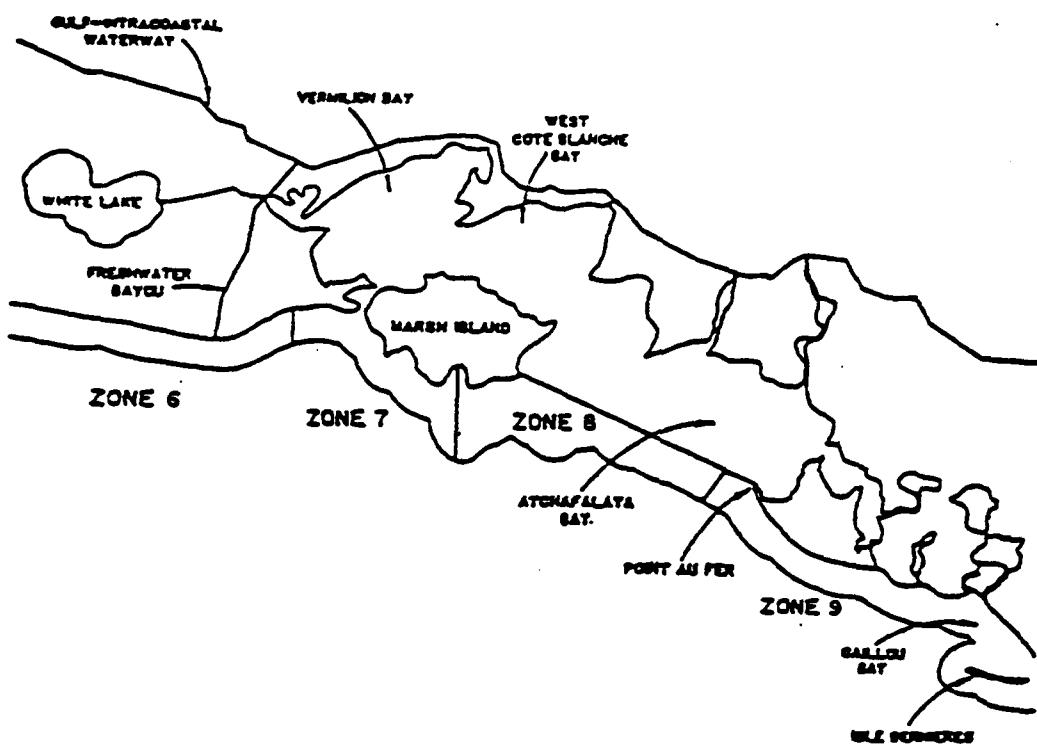
Maureen M. Mulino, Ph.D.
Vice President

MMM:kma
8617506a

Enclosure

S STEINKE - ASSOCIATES INC.

FIGURE 1





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33705

May 24, 1990 F/SER23:CAO:td

Maureen M. Mulino, Ph.D.
Steimle & Associates, Inc.
Post Office Box 865
Metairie, LA 70004

Dear Dr. Mulino:

This responds to your March 8, 1990, letter requesting information on endangered and threatened species under the jurisdiction of the National Marine Fisheries Service (NMFS) which might be present offshore Louisiana in the Gulf of Mexico. The enclosed list contains species under NMFS purview which may occur in the marine environment off Louisiana.

If you have any questions, please contact Dr. Terry Henwood, Fishery Biologist, at 813/893-3366.

Sincerely yours,

Charles A. Gravetz

Charles A. Gravetz, Chief
Protected Species Management
Branch

Enclosure



ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITATS
UNDER
NMFS JURISDICTION

Louisiana

<u>Listed Species</u>	<u>Scientific Name</u>	<u>Status</u>	<u>Date Listed</u>
finback whale	<u>Balaenoptera physalus</u>	E	12/02/70
humpback whale	<u>Megaptera novaeangliae</u>	E	12/02/70
right whale	<u>Eubaleana glacialis</u>	E	12/02/70
sei whale	<u>Balaenoptera borealis</u>	E	12/02/70
sperm whale	<u>Physeter catodon</u>	E	12/02/70
green sea turtle	<u>Chelonia mydas</u>	Th	07/28/78
hawksbill sea turtle	<u>Eretmochelys imbricata</u>	E	06/02/70
Kemp's (Atlantic)	<u>Lepidochelys kempi</u>	E	12/02/70
ridley sea turtle			
leatherback sea	<u>Dermochelys coriacea</u>	E	06/02/70
turtle			
loggerhead sea	<u>Caretta caretta</u>	Th	07/28/78
turtle			

SPECIES PROPOSED FOR LISTING

None

LISTED CRITICAL HABITAT

None

PROPOSED CRITICAL HABITAT

None



STEIMLE & ASSOCIATES, INC.

ENGINEERS, ECOLOGISTS, PLANNERS • SPECIALIZING IN THE ENVIRONMENT

P. O. BOX 868 • METAIRIE, LOUISIANA 70004 • (504) 831-2574

October 18, 1990

Dr. Terry Henwood
National Marine Fisheries Service
U.S. Department of Commerce
9450 Koger Blvd.
St. Petersburg, Florida 33702

Dear Dr. Henwood:

By letter of March 8, 1990, we explained to you that we were collecting data for the New Orleans Corps of Engineers Planning Division regarding threatened and/or endangered species which may be impacted by Section 10 and Section 404 permits to dredge reef shell in the Gulf Coast Area. We have completed the assessment which addressed the species listed in your reply of May 24, 1990, and that assessment is enclosed.

You will note that the area in which the permit is being sought is different from that described in the March 9, 1990 letter. The permit application is now for a modification of the existing permit to dredge shell in Atchafalaya and Four League Bays. This modification will request an area of the Gulf of Mexico adjacent to Atchafalaya Bay between West Longitude 91° 37' and 91° 20' and out three miles into the Gulf of Mexico. Additionally, no dredging will be done in Four League Bay which will be removed from the permitted area.

The rare and endangered species assessment which is enclosed has also been submitted to the New Orleans District Corps of Engineers Planning Division and the U. S. Fish and Wildlife Service. The assessment will be incorporated into the Environmental Impact Statement for which we are currently gathering data on that area of the Gulf of Mexico for which permits are being sought.

S STEIMLE & ASSOCIATES, INC.

Dr. Terry Henwood
National Marine Fisheries Service
October 18, 1990
Page 2

If you have any questions, please do not hesitate to call.

Sincerely,

STEIMLE & ASSOCIATES, INC.

Maureen M. Mulino

Maureen M. Mulino, Ph.D.
Vice President

MMM:bbd
8617506a

Enclosures

cc: Mr. David Reece, U.S. Army Corps Of Engineers,
New Orleans District w/ enclosures
Mr. R. Don Palmore, DRAVO w/ enclosures

BIOLOGICAL ASSESSMENT OF IMPACTS OF
PROPOSED MODIFICATION TO SHELL DREDGING PERMIT
IN COASTAL LOUISIANA

October 1990

Atchafalaya Bay and Adjacent
Gulf of Mexico Waters, Louisiana

Introduction

This assessment addresses the endangered and threatened species which may be affected by the proposed modification of permit SE (Atchafalaya Bay) 709 which allows for oyster shell dredging in Atchafalaya, Four League and East Cote Blanche Bays in Coastal Louisiana. The proposed modification would delete Four League Bay from the existing permit and incorporate a roughly three mile wide area in the Gulf of Mexico adjacent to Atchafalaya Bay lying between West Longitude 91° 37' and 91° 20'. Attachment 1 to this assessment is a map showing the existing boundaries and the proposed modification to those permit boundaries. All other existing federal and state regulations and restrictions of the permit will remain unchanged.

As in the existing permitted area, the oyster shell deposits are found in reefs, with millions of cubic yards of shell more or less cemented together. The fossil shells are buried under 4 to 8 feet of silty clay. These accumulations of fossil shells are dredged as a local source of calcium carbonate and aggregate. The type of dredge used is barge-like in design, with an excavating cutterhead, a suction ladder, a pumping system, and a materials washing and screening plant. Shell recovery is accomplished by hydraulic suction. As the cutterhead digs through the shell deposit, it moves forward by hauling in on anchor cables, causing the dredge to swing from side to side, pivoting on one of its spuds. A matrix of mud and shell enters through the cutterhead, and is pumped over a series of sizing screens and rotary washers. As the dredge pivots, the dredged material is directed back into the dredged area through a submerged discharge pipe. Most of the discharge resettles in the area of the slow-moving (approximately 50 meters/day) dredge, and the resulting bottom configuration, just after dredging, is a series of shallow troughs and mounds. A maximum of two dredges will be active at any time.

Endangered and Threatened Species

The National Marine Fisheries Service (NMFS) has provided a list of ten threatened and endangered species under their jurisdiction which might be present in the project area. Similarly, the U.S. Fish and Wildlife Service (USFWS) has provided information on three endangered and threatened species under their jurisdiction that may occur in the area. The combined list is presented below as Table 1:

TABLE 1

ENDANGERED AND THREATENED SPECIES THAT MAY OCCUR IN THE GULF OF MEXICO OFF ATCHAFALAYA BAY

<u>Listed Species</u>	<u>Scientific Name</u>	<u>Status</u>
finback whale	<u>Balaenoptera physalus</u>	Endangered
humpback whale	<u>Megaptera novaengliae</u>	Endangered
right whale	<u>Eubalaena glacialis</u>	Endangered
sei whale	<u>Balaenoptera borealis</u>	Endangered
sperm whale	<u>Physeter catodon</u>	Endangered
green sea turtle	<u>Chelonia mydas</u>	Threatened
hawksbill sea turtle	<u>Eretmochelys imbricata</u>	Endangered
Kemp's (Atlantic) ridley sea turtle	<u>Lepidochelys kempi</u>	Endangered
leatherback sea turtle	<u>Dermochelys coriacea</u>	Endangered
loggerhead sea turtle	<u>Caretta caretta</u>	Threatened
brown pelican	<u>Pelecanus occidentalis</u>	Endangered
piping plover	<u>Charadrius melodus</u>	Threatened
peregrine falcon	<u>Falco peregrinus</u>	Threatened

The five species of whales listed in Table 1 are primarily confined to deeper water depths than those found in the near shore waters off Atchafalaya Bay. Fritts et al. (1983) reported sightings of sperm whales in the Gulf of Mexico primarily from depths greater than 200 m and no sightings from waters less than 104 m deep. The remaining four species of whales (finback, humpback, right and sei) in Table 1 are baleen whales which have been observed feeding at depth of 10 m or greater (Watkins and Schevill, 1979). Lowery (1974a) stated that the baleen whales are decidedly uncommon in the Gulf of Mexico and that

most of the distributional information is based on occasional offshore sightings or rare coastal strandings. A finback whale was reported from Mississippi Sound in 1967. The occurrence was thought to be the result of the dredged navigation channel, in areas which were previously too shallow (Gunter and Christmas, 1973). The dredging of buried reef shell in the shallow 1-4 m water depths in the proposed modified project area is unlikely to impact these species.

Of the three species of endangered and threatened birds listed by the USFWS that may occur in the proposed modified project area, the brown pelican is the only year round resident of the coastal area. The piping plover and peregrine falcon overwinter in the coastal marshes and along the open coast (Lowery, 1974b).

It is unlikely that the proposed activity will impact the endangered or threatened birds listed in Table 1. The closest brown pelican nesting sites are located on Isle Denieres, approximately 20 miles to the east of the eastern most portion of the proposed modified project area. Brown pelicans feed in the shallow coastal waters (Clapp et al., 1982) and may roost or rest on mudflats or sand bars in the project area. Piping plover feed on the coastal mudflats or beaches. Peregrine falcons feed primarily on other wintering birds, such as ducks, throughout the coastal marshes and along the coast (Lowery, 1974b).

The existing permit prohibits the dredging of shell from areas within 457m (1500 ft) of any shoreline or within any area shallower than -0.6 m (-0.2 ft) NGVD. This prohibition is likely to eliminate potential negative impacts on the brown pelican nesting, roosting or resting habitat and piping plover feeding habitat. Dredged reef shell from the existing permitted area is currently being used to protect brown pelican nesting areas and reduce erosion on Queen Bess Island in Barataria Bay. The small area occupied by the maximum of two slow moving shell dredges is unlikely to impact the availability of feeding habitat for brown pelicans. The prey of the peregrine falcon are unlikely to occur in the close vicinity of the dredging activity.

Table 1 also contains five species of sea turtles identified by the NMFS as threatened or endangered that may occur in the marine environment off coastal Louisiana. A biological assessment of Kemp's ridley and loggerhead sea turtles was prepared for the Oyster Shell Dredging in Atchafalaya Bay and Adjacent Waters, Louisiana FEIS (USACOE, 1987) and is hereby included as Appendix 1 and incorporated by

reference. Similarly, a biological assessment of all five species of endangered and threatened sea turtles prepared for dredged material disposal sites in similar shallow offshore coastal Louisiana habitats is included as Appendix 2 and incorporated by reference (USACOE, 1990). A provision of the Endangered Species Act (50 CFR Part 402.12 (g)) allows agencies to incorporate by reference Biological Assessments that involve similar impacts to the same species in the same geographic area. This assessment is a revision of an earlier assessment prepared and approved by the NMFS for the Mermantau River (Bar Channel) and Freshwater Bayou (Gulf Approach Channel) dredged material disposal sites.

Background Information

Kemp's (Atlantic) Ridley Sea Turtle (Lepidochelys kempi)
Loggerhead Sea Turtle (Caretta caretta)
Green Sea Turtle (Chelonia mydas)
Leatherback Sea Turtle (Dermochelys coriacea)
Hawksbill Sea Turtle (Eretmochelys imbricata)

See attached Biological Assessments.

Impacts of Proposed Permit Modification on Sea Turtles

The potential impacts of the shell dredging permit modification are similar to those described in the Biological Assessment included in the FEIS for the project (USACOE, 1987). The potential impacts include: 1) cutterhead or hydraulic suction related mortality of turtles, primarily during the winter (December through February) months, 2) reduction of feeding success or prey abundance due to increased turbidity around the dredge and, 3) injury or mortality of turtles due to collision with service vessels or vessels transporting loaded shell barges away from and empty barges to the dredge.

The proposed project modification is not expected to impact sea turtles at any time of the year for the following reasons.

- 1) During the warm months of the year when sea turtles are active, it is not expected that the slow moving dredges will have any impact. The noise and disturbance associated with the dredge cutterhead, suction pumps and engines would enable these motile animals, if present, to leave the vicinity of the dredge or avoid contact with the cutterhead. As discussed in the referenced biological assessments, there is no present evidence of winter hibernation of sea turtles in

coastal Louisiana.

- 2) Increased turbidity associated with shell dredging activity would be localized in the close vicinity of the dredge. The discharge from the dredge is generally back into the cut. It is not expected to interfere with the sea turtle feeding activity or long term prey abundance.
- 3) The likelihood of a physical collision of service vessels with sea turtles is extremely remote. Active turtles should easily be able to avoid the vessels.

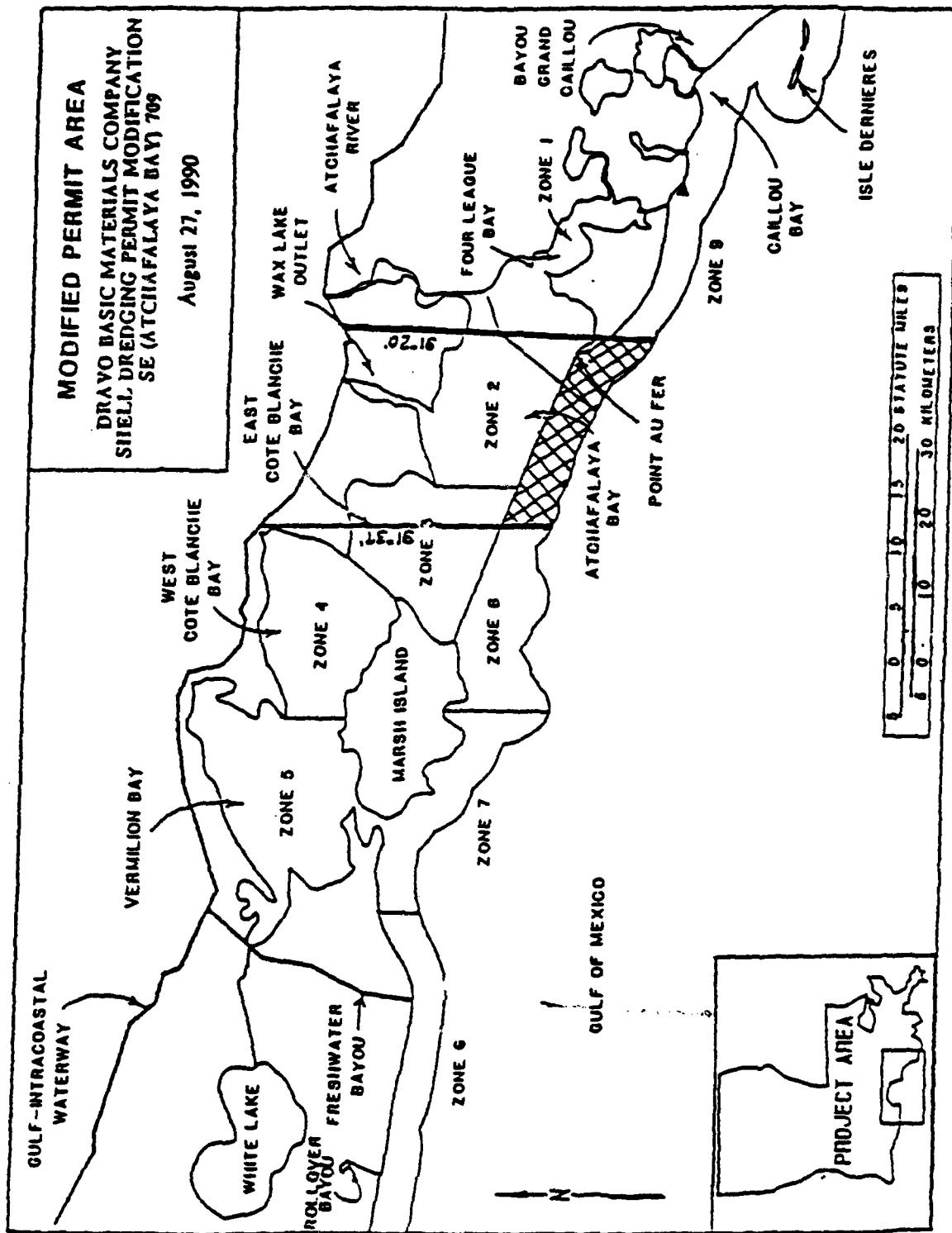
Conclusions

Based on current information, the impact of the proposed modification to the shell dredging permit on endangered or threatened species or their critical habitat in Louisiana is negligible.

REFERENCES

- Clapp, R. B., R. C. Banks, D. Morgan-Jacobs and W. A. Hoffman. 1982. Marine birds of the Southeastern United States and Gulf of Mexico. Part I. Gaviiformes through Pelecaniformes. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C. FWS/OBS-82/01. 637pp.
- Fritts, T. H., A. B. Irvine, R. D. Jennings, L. A. Collum, W. Hoffman and M. A. McGehee. 1983. Turtles birds and mammals in the northern Gulf of Mexico and nearby Atlantic waters. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C. FWS/OBS-82/65. 455pp.
- Gunter, G. and J. V. Christmas. 1973. Stranding records of a finback whale, Balenoptera physalus, from Mississippi and the goose beaked whale, Ziphius cavirostris, from Louisiana. Gulf Res. Rep. 4(2):169-173.
- Lowery, G. H. 1974a. The Mammals of Louisiana and its Adjacent Waters. LSU Press, Baton Rouge, La. 565pp.
- Lowery, G. H. 1974b. Louisiana Birds. Third Edition. LSU Press, Baton Rouge, La. 651 pp.
- USACOE. 1987. FEIS Oyster Shell Dredging in Atchafalaya Bay and Adjacent Waters, Louisiana. U.S. Army Engineer District, New Orleans, La. 145pp. + 9 fig. and 4 appd.
- USACOE. 1990. Biological assessment of impacts of proposed designation for ocean dredged material disposal sites in coastal Louisiana. U.S. Army Engineer District, New Orleans, La. 4pp. + appd.
- Watkins, W. A. and W. E. Schevill. 1979. Aerial observations of feeding behavior in four baleen whales: Eubalaena glacialis, Balenoptera borealis, Megaptera novaeangliae and Balenoptera physalus. J. Mammal. 60(1):155-163.

ATTACHMENT 1



Attachment 1-1



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
 9450 Koger Boulevard
 St. Petersburg, FL 33702

March 25, 1991 F/SER13:JEB

Mr. R. H. Schroeder, Jr.
 Chief, Planning Division
 Department of the Army
 New Orleans District
 Corps of Engineers
 New Orleans, LA 70160-0267

Dear Mr. Schroeder:

This responds to your letter dated March 1, 1991 regarding the proposed shell dredging in the Gulf of Mexico adjacent to Atchafalaya Bay, Louisiana, by Dravo Basic Materials. A Biological Assessment (BA) was transmitted pursuant to Section 7 of the Endangered Species Act of 1973 (ESA).

We have reviewed the BA and concur with your determination that populations of endangered or threatened species under our purview would not be adversely affected by the proposed activity.

This concludes consultation responsibilities under Section 7 of the ESA. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified, or critical habitat is determined that may be affected by the proposed activity.

If you have any questions please contact Jeffrey Brown, Fishery Biologist, at (813) 893-3366.

Sincerely,

Charles A. Oravetz
 Charles Oravetz, Chief
 Protected Species Management
 Branch

cc: F/PR2

Attachment 1-2



APPENDIX F

**COMMENTS RECEIVED
AND
COMMENT RESPONSES**

Theresa D. Buchert
1506 Bonnabel Blvd.
Metairie, LA 70005
April 27, 1993

Mr. Robert H. Bosenberg
CELMN-PB-RS
Coastal Engineers New Orleans
P.O. Box 60267
New Orleans, LA 70160

Dear Sir:

I recently received notice of the public hearing for oyster shell dredging in the Gulf of Mexico, St. Mary and Terrebonne Parishes. I am opposed to the dredging because I have seen first hand the adverse effects of dredging on the waters of Lake Ponchartrain. When the lake was being dredged, the wakes behind our boat were a murky yellow to light brown. Now that the dredging has stopped the wakes have become whiter, the water clarity has considerably improved and numbers of fish are returning to the lake again. Waterbottoms contain ecosystems that are best left undisturbed. Dredging will certainly be detrimental to the water quality and marine life involved. Let's not take an environmental step backward by allowing dredging.

Sincerely,
Theresa D. Buchert
Theresa D. Buchert

GENERAL PUBLIC:

LETTERS OF OBJECTION (Received Prior to Public Hearing)

Response to Theresa D. Buchert, letter dated April 27, 1993

The EIS concluded that water quality and bottom communities will be impacted only locally and for a short-time. Dredging in the Gulf would occur in a system characterized by highly variable turbidity levels controlled by several factors such as riverine inputs (see our comments at Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company, letter dated May 12, 1993, Impact on Delta Building Processes and Our Discussion at Section 3.3.), wind speed and direction and salinity levels.

1776 LINCOLN STREET

DENVER, COLORADO 80203

303/861-8140

FAX 303/861-0934



May 13, 1993

District Engineer
ATTN: CELMN-PD-RS
U.S. Army Engineer District
Post Office Box 60267
New Orleans, Louisiana 70160-0267

RE: Draft Environmental Impact Statement and
Appendices for Oyster Shell Dredging in
Gulf of Mexico Waters, St. Mary and
Terrebonne Parishes, Louisiana, April 1993

Dear Sirs:

St. Mary Land & Exploration Company owns approximately 24,900 acres of property along the shores of Atchafalaya and East Cote Blanche Bays which lie north of the area of proposed oyster shell dredging as described in the above referenced document. We are concerned that this activity will adversely impact our property. At our request, Dr. Sherwood M. Gagliano of Coastal Environments, Inc., who is an expert in coastal processes and who is familiar with the area, has reviewed the Environmental Impact Statement. A copy of the results of his review is attached.

Based upon our company's familiarity with the area resulting from many years experience in management of this property and the concerns expressed by Dr. Gagliano, we are opposed to the issuance of a Section 10 permit for the proposed shell dredging activity.

Thank you for providing an opportunity to comment on the document.

Sincerely yours,

A handwritten signature in cursive ink, appearing to read "Linda A. Ditsworth".

Linda A. Ditsworth
Assistant Vice President-Land

Response to St. Mary Land & Exploration Company, letter dated May 13, 1993

We note your general letter of objection & transmittal of remarks prepared by Coastal Environments, Inc.



Review of

Draft Environmental Impact Statement and Appendixes for Oyster Shell Dredging in Gulf of Mexico Waters, St. Mary and Terrebonne Parishes, Louisiana, April 1993.

Introduction

At the request of the St. Mary Land & Exploration Company (SML&EC) I have reviewed the the following document:

U.S. Army Corps of Engineers, New Orleans District, April 1993.
*Draft Environmental Impact Statement and Appendixes for Oyster Shell
Dredging in Gulf of Mexico Waters, St. Mary and Terrebonne Parishes,
Louisiana.*

The SML&EC owns 24,900 acres of property which lies along the shores of Atchafalaya and East Cote Blanche Bays and is located immediately north of the areas of proposed shell dredging (Figure 1). This property would be adversely impacted by changes resulting from the dredging.

Impact on Hydrology, Tides and Wave Energy

The buried shell deposits and reefs of the proposed dredging area constitute an essential element of the skeletal framework and geological foundation of the Atchafalaya, East Cote Blanche, West Cote Blanche and Vermilion Bay system. The natural reefs (both surface and buried) form a barrier that controls and influences the hydrology, tidal prism and wave energy in these bays. The proposed dredging is along the nearshore platform of this natural barrier in approximately 3 to 9 feet of water. Any cuts will weaken the platform and threaten the integrity of the barrier feature.

Severe shoreline erosion is presently occurring on both sides of Point Chevreuil. Cuts made in the natural barrier may result in higher storm wave energy and/or storm surge entering the bays. Such increase in energy acting on the shore will accelerate shoreline erosion.

Removal of all, or even parts of this barrier will result in a greater volume of water moving into and out of the bay system in response to lunar and wind driven tides. The resulting increase in tidal prism will cause greater ebb and flow movement in natural streams and canals. This will in turn accelerate erosion and export of poorly consolidated organic soils. Such soils are characteristic of the wetlands of the SML&EC property and the area in general.

Local informants indicate that wave and tidal energy in the Point Chevreuil area has increased significantly in recent decades. This is attributed to dredge cuts resulting from shell dredging in Atchafalaya Bay.

**Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company,
letter dated May 12, 1993**

Impact on Hydrology, Tides and Wave Energies

We conclude that the probability of your suggested effect occurring is insignificantly small. For the proposed action to threaten the integrity of the bays and their associated wetlands, at a minimum the following would have to apply: 1) shells in GOM waters essentially form a continuous off shore barrier; 2) shells in the GOM are the only such barrier; 3) many if not all shell deposits would have to be dredged; 4) sediment inputs have an insignificant influence on replenishing and maintaining shallow water depths; and, 5) the erosive forces at work locally on wetlands play only a relatively minor role in wetland dynamics. We believe some of the above constraints are probably more influential (i.e., reduced sediment inputs to wetlands, subsidence, wave action on shorelines) than others (i.e., shell deposits between Marsh Island and Point au Fer Island have been placed off limits). We also believe that the probability of all five constraints being met is extremely low.

See above response. Additionally, several other factors would reasonably be expected to contribute to shoreline erosion at Point Chevreuil, a location about 12 miles across open water from the nearest point where the proposed activity could possibly occur. Wind speed, wind direction and navigation activity, as they collectively affect wave action on unprotected shorelines, and an occasionally naturally occurring stressful salinity event, especially in riverine influenced and sediment rich environments, are much more likely to cause shoreline erosion. (See also Section 3.3. Geological Setting)

The impacts of concern to you would have a better chance of occurring if shell dredging cuts were comparable in size and configuration to a navigation channel. Shell dredging troughs are neither the size nor are they the configuration of a navigation project such as the Atchafalaya Federal channel. Therefore, no biologically significant change in tidal volume exchange is expected.

Your comment is acknowledged. Considering that Point Chevreuil is nearly 12 open-water miles northerly from the project area, we feel that other explanations could account for some or all of the reported differences in wave and tidal energies at Point Chevreuil over the last several decades coincident with shell dredging. As we have stated in the EIS, sea level rise and subsidence are two possible reasons, as well as changes related to the hydrodynamics of the Atchafalaya and Mississippi River systems during the same time frame.

Shell Dredging is Inconsistent with State and Federal Wetland Conservation Programs

Dredging will be counterproductive in regard to efforts of both the Federal Government and the State of Louisiana to conserve and enhance valuable coastal wetlands. A shoreline protection project in this bay area is presently under consideration for funding under the Coastal Wetlands Protection, Preservation, and Restoration Act. The estimated cost of the project is \$700,000. Shell dredging will cause an increase in shoreline erosion and marsh loss around the bays and thus will be directly contrary to the objectives of these programs.

The rational for economic benefits of the project is questionable. The EIS indicates that the state would receive \$1.48 million in royalties and severance tax annually. Bank and shore stabilization with rip rap, shell or sand typically costs \$1 to \$1.5 million per mile. A significant part of this cost is the material. It would be folly to allow shell to be dredged from this area in exchange for small short-term benefits only to be forced to import shoreline stabilization material into the area a few years later at a much higher cost.

The shell dredging industry has done major damage to the bay systems by past removal of reefs. Proper restoration of the destroyed reefs would cost hundreds of millions of dollars.

Removal of Coarse Granular Material from the Coastal Zone

The Louisiana coastal zone has approximately 30,000 miles of land-water interface. Only about 350 miles consist of sand or shell beaches, the remainder are highly erodible muddy shorelines and banklines. Along the muddy shorelines of Louisiana sand and shell are precious natural materials because they absorb wave energy and are resistant to erosion.

Within this context, shell is indeed a valuable resource. Dredging of buried shell deposits should be allowed only in instances where the shell is used to stabilize eroding shorelines or islands. It should never be exported from the lake or bay system where it occurs.

Impact on Delta Building Processes

Atchafalaya Bay is the only area along the entire Louisiana coast where significant natural land building processes are occurring. The impact statement indicates that "Because of the considerable distances of the proposed dredging zones from the shore, shell dredging is not expected to have any impact on the building of deltas in Atchafalaya Bay." The zone of the proposed dredging is presently an area of submarine delta growth. Water depths are from about 3 to 9 feet. It can be anticipated that future delta growth will occur within this area. The EIS indicates that over an 8 year period 12.8 to 13.6 million cubic yards (MCY) of shell will be removed. Comparison of data related to subdelta building in Atchafalaya Bay and the active Mississippi River delta area indicate that when deposited in shallow coastal waters 13.6 MCY of sediment could build 300 to 350 acres of emergent subdelta wetlands. Thus, removal of this amount of sediment from an active delta system reduces the wetland building capacity of the system by 300 to 350 acres and represents a predictable impact. The growing subdeltas associated with the Wax Lake Outlet and the Lower Atchafalaya River provide some protection to the SML&EC against the ravages of coastal erosion. Any reduction in their rate of growth will be detrimental to the property.

Shell Dredging is Inconsistent with State and Federal Wetland Conservation Programs

Your comment is acknowledged, but we disagree. We know of several Coastal Wetland Planning, Protection, and Restoration (CWPPRA) Projects being considered along the rims of the Cote Blanche and Vermilion Bays. Project designs represent the collective best approximation of the action necessary to address site specific causes of marsh loss, or to provide marsh protection or marsh restoration. In nearly all cases, wind or navigation induced wave erosion, or an imbalance between tidal flow patterns and sediment sources, were concluded to be the principal reasons for the observed losses. The CWPPRA projects being considered include ones proposed by members of the general public, landowners, and representatives of state and federal agencies. Selection of projects for more detailed study and implementation is contingent upon the approval of several state agencies as well.

Your comment is noted and we disagree because we don't have any reason to believe that the dredging of shell in the GOM accelerates marsh losses. Therefore, the financial linkage you attempt to make does not logically follow.

Comment noted. Shell dredging in the coastal bays does have acknowledged impacts but those impacts were determined to be insignificant. Please refer to:

US Army, Corps of Engineers - New Orleans District. 1987.

Oyster Shell Dredging in Atchafalaya Bay and Adjacent Waters, Louisiana: Final Environmental Impact Statement and Appendixes. New Orleans, Louisiana.

Removal of Coarse Granular Material From the Coastal Zone

We believe there are two explicit issues contained within these paragraphs: 1) the only acceptable use of dredged shell is for wetland protection and/or restoration projects; and, 2) shells should only be used within the basin from which they were dredged.

You seemingly assert that dredging for shells should only occur if shells are used exclusively for wetland protection/restoration projects. We believe that this assertion suggests: 1) that some uses of shell are inherently superior to others regardless of the impacts; and, thus 2) that the EIS process should result in our determining what limits can be imposed on other legitimate uses of shells. We disagree. Our responsibilities in the EIS process are quite different, and include determining: 1) what other economically and socially appropriate uses and applications there are for shells; and, 2) what alternative materials might be available to meet those uses and applications and their associated impacts. These determinations all go to addressing the need for the proposed action. The EIS does that.

We agree with you that dredged shell can be used for wetland protection/restoration projects. But, we don't accept the premise of your second issue....that shells used for such projects are intrinsically more valuable when used only in the basin from which they were dredged.

Impact on Delta Building Processes

No portion of the Wax Lake Delta is within the nearshore GOM waters that are part of the proposed action. Only a portion of the nearshore Gulf shell dredging area is influenced by the outer reaches of the Atchafalaya River delta activity and only some of the inventoried buried shell lenses occur there. The sediment dynamics of delta margins reflect the interaction of riverine, Gulf and meteorologic forces. That's why maintenance dredging of the Atchafalaya River project must occur so often and produces such large volumes of dredged sediment material. That's also why delta margins are affected far less by dredging than are other portions of more mature accreting deltas. Therefore, we believe the situation is overstated by: a) implying that all shells would be removed from the active Atchafalaya zone (see Figure 7 in the EIS); b) overlooking the facts that....shoreline retreat has been a long-term problem in the vicinity (see Figure 4) and that shell dredging would have no effect on how much sediment the Atchafalaya River delivers to the project area; and, c) discounting the fact that other erosive forces have been site specifically linked to the problem of wetland loss being experienced by St. Mary Land & Exploration Company.

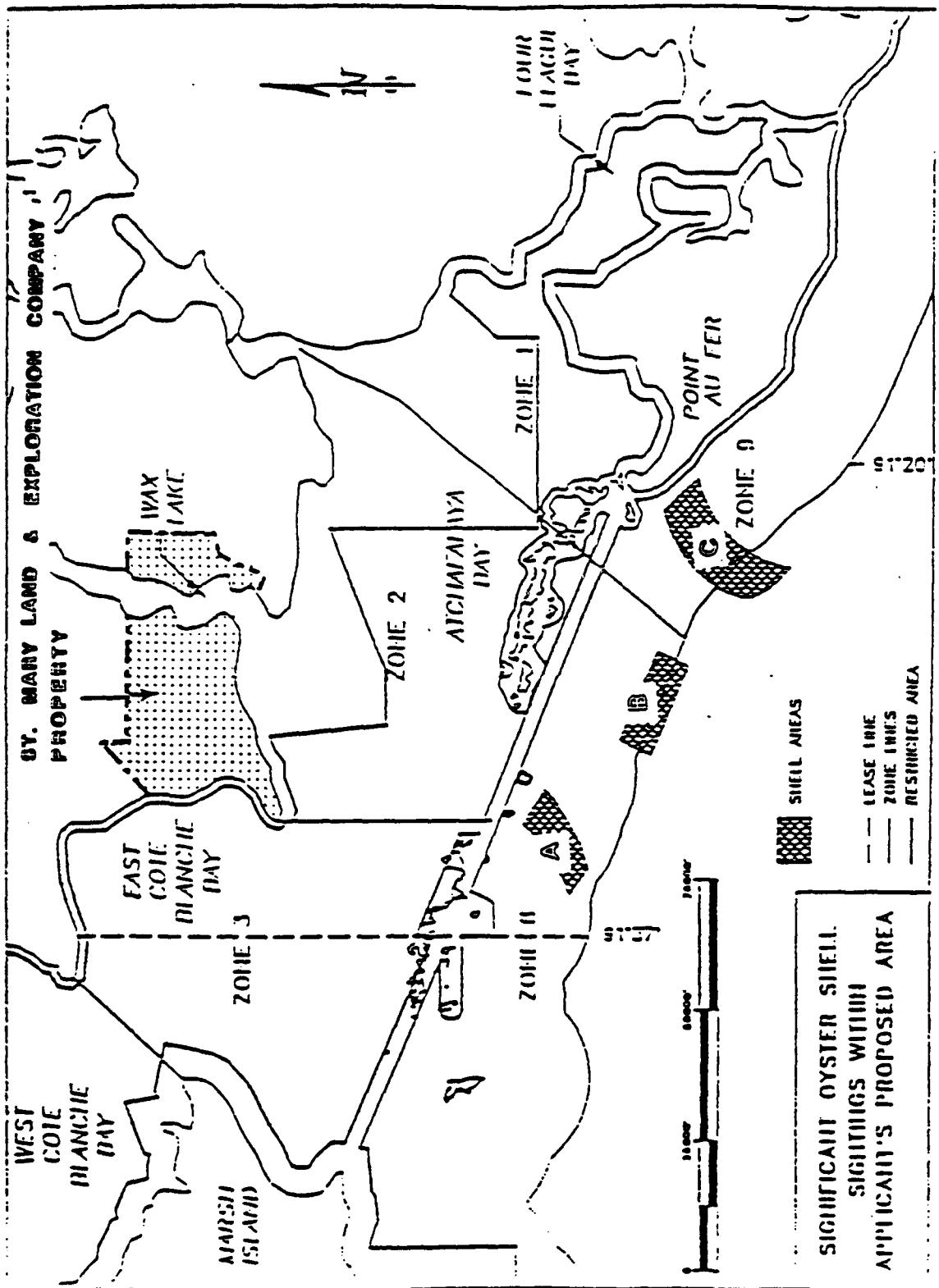


Figure 1. Map showing zones and areas of proposed shell dredging and location of St. Mary Land & Exploration Company property. (Modified from Draft Environmental Impact Statement, Figure 7).

Conclusions

The proposed shell dredging could cause changes in the processes within Atchafalaya and East Cote Blanche Bay which would adversely impact the SML&EC property by accelerating shoreline erosion and tidal scour of organic soils. The proposed dredging is also inconsistent with state and federal programs for conserving, protecting, and enhancing coastal wetlands.

Sherwood M. Gagliano, Ph.D.
May 12, 1993

CHARLES L. DENECHAUD (1981-1986)
CHARLES L. DENECHAUD, JR.
CHARLES A. RAYER
CHARLES L. DENECHAUD II
THOMAS E. SCHRENFELD
WARD B. DENECHAUD
WRENCE J. SPRINGER
JIM H. RICHARD

DENECHAUD AND DENECHAUD

ATTORNEYS AND COUNSELLORS AT LAW
1412 PERE MARQUETTE BUILDING
NEW ORLEANS, LOUISIANA 70112-2385

CONFIDENTIAL

(504) 522-4756
FAX (504) 568-0783

May 6, 1993

Mr. Albert J. Guillot
Chief, Operations and Readiness
Division
Western Evaluation Section
Department of the Army
New Orleans District,
Corps of Engineers
P.O. Box 60257
New Orleans, LA 70160-0257

RE: OF 4941 - Point au Fer Island - Shell Dredging -
SW (Gulf of Mexico) 3559

Dear Mr. Guillot:

Please be advised that this firm represents the landowners of Point au Fer Island, a 47,000 acre tract of marshland located in Terrebonne Parish, due south of Morgan City, Louisiana.

I am in receipt a copy of your communication of April 7, 1993, entitled "Announcement of Public Hearing for Shell Dredging in the Gulf of Mexico."

I am also in possession of the Draft of Environmental Impact Statement and Appendixes, dated April, 1993, and I enclose herewith a copy of the page indicating the area to be considered for shell dredging approval. You will note that the area in question abuts the western coast of Point au Fer Island, and may, in fact, be expanded to cover the entire southern coast of the Island at a future date.

This letter will serve as formal notice that the landowners of Point au Fer Island hereby object and will vigorously oppose any shell dredging operations that are conducted within one mile of the coast of Point au Fer Island.

Some years ago, shell dredging operations were observed taking place immediately adjacent to the northwest portion of Point au Fer Island, and as a result thereof, the loss of the shell base contributed to a breach in the tip of the Island, which has now resulted in a considerable loss of marshland.

Response to Denechaud and Denechaud, Letter dated May 6, 1993

Your letter of objection based upon a concern for induced land loss in and about Point au Fer Island is noted. (NOTE: Please see Letters of Support, where this objection was withdrawn).

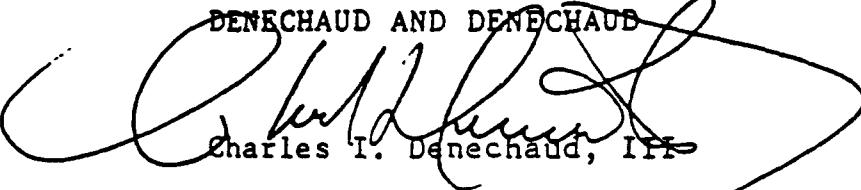
Mr. Albert J. Guillot
May 6, 1993
Page 2

We would appreciate your keeping this office advised of the status of this application.

With best regards, I am

Very truly yours,

DENECHAUD AND DENECHAUD


Charles I. Denechaud, I.P.

CID, III/bdn
cc Mr. John M. Smyth (w/Encl.)
Mr. Joseph E. Ingraham (w/Encl.)
Mr. Gerald M. "Jerry" LeBlanc

THIS PAGE LEFT BLANK

APR 21 REC'D

SAVE OUR TICKFAW

TICKFAW RIVER BASIN GROUP

P.O. Box 549, Springfield, LA 70482

Phone (504) 542-6268

(504) 695-6571 FAX (504) 542-6371

April 19, 1993

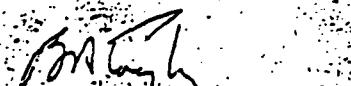
Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 360267
New Orleans, LA 70160-0267

Attention: Operations and Readiness Division
Western Evaluation Section

Subject: SW(Gulf of Mexico)3559

Comment:

The shell reefs that are proposed to be mined appear to be in shallow water (less than 10 feet) within 10 miles from the coast. I would imagine that these structures are vital for the protection of the fragile marshy mainland to the north. Unless it is known what the maximum amount of shell that can be mined without compromising this protection I would be against removing them.


Ben Taylor, President
Tickfaw River Basin Group

Response to Save Our Tickfaw, Letter dated April 19, 1993

Your comment is noted. Please see our comment at **Response to Coastal Environments, Impact on Hydrology, Tides and Wave Energies.** See page F-5

Fax-It, 504 262 2472

TEL 100

6404 PUI

From: Harold J. Schoeffler, Conservation Chair
Delta Chapter Sierra Club
P.O. Box 2218
Lafayette, LA 70502

To: District Engineer
Attn: Celmn-PD-RS
U.S. Army Engineer District
P.O. Box 60267
New Orleans, LA 70160-0267

May 27, 1993

Dear Sirs:

We are deeply concerned about the issue of shell dredging in the Gulf of Mexico as described in your environmental impact study of April 1993. This environmental impact statement falls short in the following areas:

1. Alternatives discussed of "to dredge or not to dredge" is almost comical. The alternatives of other aggregate materials such as limestone, gravel, man-made aggregates, recycled crushed concrete, shells drawn from marshland sites and others should have been considered in the alternative aspect of this study.
2. The EIS fails miserably in its investigation of endangered species such as Kemp Ridley turtles and the Brown Pelican, both of which are known to inhabit the regions under investigation.
3. The EIS implies there are no live reefs in the dredge sites. There are commercial oyster reefs within the area and rather large live reefs just south of Point Au Fer that are worthy of complete protection. The EIS should map and identify these live reefs and assure the public that no dredging would occur within one mile of these highly sensitive areas.
4. The EIS fails to be site specific. The area covered is 56,000 acres and according to the document, both dredges operating would cover 2 acres per day. In a five year period that would be less than 4,000 acres, certainly there is no need for this document to cover in access of 50,000 acres not effected.

**GENERAL PUBLIC
LETTERS OF OBJECTION (Received At or After the Public Hearing)**

Response to Mr. Harold Schoeffler, Letter dated May 27, 1993

1. The Draft EIS does address the uses of Alternative Materials in EIS Section 2.2.1.1. A table of alternative materials and uses is also provided.
2. The endangered and threatened species in the project area are addressed in EIS Section 3.6.2.5. Appendix E includes all correspondence documenting the consultations regarding the assessment of project impacts on the endangered species with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. This consultation resulted in the concurrence of both agencies with the assessment and its conclusions that no endangered species in the project area was likely to be impacted by the project.
3. Live oysters could occur in the proposed project area. Shell dredging, however, is conducted only in areas which have been verified by an independent surveyor as having no exposed shell reef in order to minimize impacts to living resources. This is a requirement of the Louisiana Coastal Use permit and could be made a condition of a 404 permit should it be issued. These data are submitted to the Louisiana Wildlife and Fisheries and the Louisiana Department of Natural Resources, Coastal Management Division. In order to be considered a living reef, a reef must be exposed above the mud line.
4. We cannot be anymore site specific because, as stated in the EIS, the Louisiana Department of Wildlife and Fisheries established the boundaries of the lease area within their legal authorities. The Corps of Engineers does not have the authority to alter those boundaries. As such, we are obliged to consider the possibility of dredging occurring at some time within the lease area.

page 2

5. The EIS fails miserably addressing the impact on shrimping. As this is a very productive shrimp harvesting area, and the possibility that shell dredging could have a negative impact, must be thoroughly explored.
6. The EIS fails to address impacts on highly sensitive natural areas such as the Atchafalaya wildlife management area, mud flats, sand bars, emerging delta lobes, water fowl nesting and feeding areas, nesting sites for skimmers and other sea birds, oyster reefs sub-a real and sub-aqueous and highly productive sea-grass beds.
7. The EIS fails to address the fact that a hazardous waste dump site just east of the main channel south of Eugene Island exist and dredging in that area would re-suspend highly toxic materials, and further bring those materials on barges to land sites in our communities. In addition, radio active and toxic materials have been dumped in both the drilling and productive phases of the 100's of wells that are part of the Eugene Island and Rabbit Island oil fields. Again these materials could be suspended into the water column and brought to parking lots and roadways on shore.
8. The EIS fails to measure impacts on barrier reefs and islands in the area and what effect those changes would have on hurricane protection and flooding.
9. The EIS falls short of investigating cumulative impacts. The fact that most of the barrier reefs shown on your map have all been removed by shell dredging for 70 years in this area. The impact of hundreds of oil wells and the associated pipelines, the continuous channel dredging and continuous marine traffic in support of the offshore oil industry, plus others all should be collectively addressed in this portion of the EIS.

Response to Mr. Harold Schoeffler, Letter dated May 27, 1993 (page 2)

5. We acknowledge the importance of commercial fishing (EIS Sections 3.6.2.1. and 3.7.1.1.) as well as the potential for negative impacts from shell dredging on commercial finfish and shellfish (EIS Section 3.6.2.1.2.). We also concluded that the negative impacts would not be significant.
6. We disagree. Additional discussion within the context of the EIS is not warranted.
7. Because the subject of the EIS is a permit matter, the applicable procedures regarding incurred liability and impacts from hazardous, toxic or radioactive wastes (Corps of Engineers Engineering Regulation 1165-2-132) is the responsibility of the permit applicant. Nonetheless, we determined that neither the EPA nor the LDNR has designated any portion of the proposed shell dredging area as a hazardous waste disposal area (i.e., response action area). Thus, the proposed permit action does not impact a hazardous waste disposal site.

The Rabbit Island production field is in Atchafalaya Bay. The field is many miles northerly from the most northern limit of the proposed shell dredging area. Additionally, the dynamic chemical and physical riverine and Gulf forces acting upon the candidate shell dredging area, the area between the field and the proposed dredging site, and the field itself, are likely to naturally and fairly rapidly diminish concentrations of the kinds of compounds that are of concern to your organization. Therefore, we believe the distance and natural forces involved make it unnecessary to give any further consideration to the Rabbit Island field in this context.

However, the Corps is required to address water quality issues pursuant to our application of Section 404 (b) (1) Guidelines of the Clean Water Act to the proposed project. The 404 evaluation will occur after completion of this EIS.

A condition for the issuance of the requested Federal permit is that the State of Louisiana must first issue a Water Quality Certification. By regulation, issuance of that certificate must be considered by the Corps of Engineers as conclusive evidence that the project will have an acceptable impact on water quality, unless the EPA advises otherwise (and they haven't). Therefore, we believe our discussion of water quality (Sections 3.5.2. and 3.5.3.), inclusive of heavy metals and pesticides, is appropriate. However, the EIS was further clarified regarding the issues you raised by our adding an advisory to the text in Section 3.5.3. It directs the reader to this response for additional information.

8. We found no basis to concur with your allegation that shell dredging would have measurable adverse effects on barrier islands and shell deposits of a magnitude sufficient to diminish the natural function those landscape features currently serve regarding hurricane protection and flooding. Our conclusion is that the adverse effects you allude to are not reasonably foreseeable direct or indirect consequences of the shell dredging operations described by the applicant. Specifically, the state's Coastal Use Permit precludes dredging within specified distances of islands or dredging live or exposed shell deposits. The permit application submitted by the shell dredgers to the Corps of Engineers included those same stipulations. The Corps is not empowered to override a state-imposed restriction. Thus, the permit action applied for and being considered by the New Orleans District (NOD) avoids actions that are of concern to your organization.
9. The EIS addresses cumulative impacts (Section 4). The activities of concern to your organization are included in that portion of the EIS. We believe that indirect evidence, drawn from maintenance activities for the Federally-maintained Atchafalaya navigation channel (page EIS-121) indicates that the natural forces do overshadow and will quickly erase or mask the effects of shell dredging. However, we have added additional narrative to this section of the EIS (Section 3.3.4.1.). The addition is intended to set in perspective the basis for our conclusion that shell dredging is an activity that would be insignificant, localized and have only a transient affect on local bottom elevations.

The depths and overall bathymetry of the nearshore GOM and nearby bays are affected over a geographic area significantly larger than the proposed project area by very large scale natural sediment transport/movement dynamics of the Mississippi and Atchafalaya River systems as well as the GOM.

The Atchafalaya navigation channel is within that influenced area. That channel may be thought of as a maintained depression in the nearshore Gulf. The frequency and volume of sediment material removed from that waterway (about a million cubic yards per year) for maintenance purposes is evidence of the magnitude of the natural forces at work. In contrast, a one-time shell dredging event creates a partly refilled depression typically only a few feet deeper than the surrounding bottom contours. By comparison, we concluded that the effect of shell dredging on the bathymetry of the GOM would be insignificant, localized and only a transient affect on local bottom elevations.

page 3

10. We are further concerned that the EIS leaves out the fact that the dredges themselves and the related tugs and barges draw 6-10 feet of water and that much of the area in question is substantially much less than 6 feet. Extensive access canals are needed to reach and transport the product. These canals perhaps should be under a separate permit, and should be marked, mapped and identified to protect commercial fishing interest.

We are further concerned that this activity involves the dumping of substantial waste and should come under the EPA ocean dumping regulations. The spoil from this activity should be placed in an approved dumpsite.

We are also concerned that the wash-water portion of the shell dredging activity involves a point source discharge that requires a NPDES permit.

We feel that this draft EIS is one that fails to consider the real impacts of shell dredging. It fails to consider worse case conditions, and seems to be a blatant endorsement of an environmentally costly undertaking.

Yours in conservation;

Harold J. Schoeffler
Harold J. Schoeffler

10. You are correct in assuming that dredging to provide flotation to access shell deposits is not covered in the EIS. That situation is the exception rather than the rule. Accordingly, it was not included by the applicant in their permit application and, thus, is not covered in the EIS. However, based upon your comment, we asked the applicant to be more specific about this matter. Based upon their response, dredging to create flotation to access a shell deposit is not now but could be a consideration in a very limited area immediately to the west of the Federal Atchafalaya River Navigation Channel. But, the applicant is aware that any such activity would require a separate permit and, as such, would be subjected to a public interest review and environmental impact analysis.

We have determined that the excavated material discharged from the dredge serves to back-fill dredge cuts. As such, the discharged dredged material is being used beneficially, not simply being disposed of or discarded. If it were merely being discarded, it would be an ocean disposal subject to the ocean dumping regulations. We advised the US EPA of our position and that agency has concurred with our determination.

We contacted EPA regarding your comment about the need for a NPDES permit. EPA administers that program and informed us that no such permit is required.

We believe that we have considered the impacts of shell dredging, and that basing our analysis on the entire lease area is the proper scope and scale of analysis and fully and objectively discloses the impacts.

MIAMI CORPORATION
300 LA RUE FRANCE
SUITE 201
LAFAYETTE, LOUISIANA 70508
TELEPHONE (318) 264-1688
FAX NO. (318) 264-8499

May 27, 1993

District Engineer
ATTN: CELMN-PD-RS
U.S. Army Engineer District
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Re: Draft Environmental Impact Statement and
Oyster Shell Dredging in Gulf of Mexico Waters
St. Mary and Terebonne Parishes, Louisiana

Gentlemen:

After discussing the referenced document with several other coastal wetland landowners, Miami Corporation must publicly object to the destruction of the skeletal framework and geological foundation of the offshore bay system by shell dredging. The shoreline of Miami's property from the Bayou Sale area west to Weeks Island is daily being pounded by the increased volumes of water due to earlier dredging operations and the interior is being scoured. As the owner of over 65,000 acres in this area, Miami objects to this activity and the increase in shoreline erosion and scouring of the organic soils. Plats of the company's fee is enclosed.

In light of the public awareness of these non-renewable wetlands and the Congressional and State funding of wetland restoration projects, it is hard to conceive that such dredging could even be conceived as environmentally sound.

Thank you for this opportunity to present our opinion on this counter productive activity.

Very truly yours,

MIAMI CORPORATION

Roger G. Vincent, Jr.

RGV, JR:gsc

G_2218

Response to Mr. Roger Vincent, Miami Corporation, Letter dated May 27, 1993

We share your concern about erosion of the north shores of West Cote Blanche and Vermilion Bays and Weeks Bay. However, we do not believe that shell dredging in the GOM can reasonably be expected to affect wetland losses occurring along the bay shores of concern to you. Our basis for that conclusion is detailed in our response to a similar concern expressed by Coastal Environments on behalf of St. Mary Land & Exploration Company, especially our response at Impact on Hydrology, Tides and Wave Energies.

Tulane Environmental Law Clinic

7039 Freret Street
New Orleans, Louisiana 70118
(504) 865-5789
FAX: (504) 862-8721

May 27, 1993

BY FAX

Mr. Robert Bosenberg
U. S. Army Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160-0267

Re: Draft EIS for Oyster Shell Dredging in Gulf of Mexico
Waters, St. Mary and Terrebonne Parishes, Louisiana

Dear Mr. Bosenberg:

Members of the Terrebonne Fisherman Organization and the League of Woman Voters have expressed serious concern with the proposed oyster dredging operations in St. Mary and Terrebonne parishes. In response to these concerns, I have reviewed the draft EIS and submit the following comments.

The apprehension expressed by commercial and recreational fisherman and environmentally aware citizen's groups regarding oyster dredging is based on the real threat to Louisiana's fragile coastal and offshore ecosystem. Louisiana is the only Gulf Coast state which still allows the dredging of fossil oyster shell. Other states have banned dredging due to adverse ecological impacts. This draft EIS fails to adequately respond to these adverse impacts and the effects that they will have on Louisiana's commercial and recreational fisheries industries.

The commercial fishing industry produced 269 billion dollars in Louisiana in 1991 (Kapplin, 1993, pers. comm.). The draft EIS acknowledges that the shrimping industry produced 49.1 million dollars in the adjacent four parish region in 1990 (subsection 3.7.1.1.). However, the draft EIS fails to adequately address the potential adverse impacts of oyster shell dredging on the vital commercial fisheries industry. In discussing the impacts of the dredging operations, the draft EIS addresses only those impacts related to increased turbidity and simply dismisses these as being minimal and temporary.

This area supports a valuable white shrimp and seabob fishery industry and the draft EIS fails to deal with the long-term impacts to this commercial shrimping industry. The document acknowledges that it takes up to 6 years for dredged troughs to fill in the Atchafalaya and Four League Bays (subsection 3.3.4.2). From a geological perspective, this can be considered to represent extremely rapid localized sedimentation. However, from the perspective of the shrimper, this dredged trough represents acreage

Response to Tulane Environmental Law Clinic. Letter dated May 27, 1993

It seems to us that the heart of your concern is that cuts are unfishable by shrimpers for periods of up to six years. From that concern springs your request to perform more extensive economic analyses. We contacted Mr. Brandt Savoie (504-765-2401). Mr. Savoie is the Shellfish Project Manager with the Louisiana Wildlife and Fisheries's Marine Fisheries Division. We called him to inquire about this matter. Based on his experience in Lake Pontchartrain and his professional insight relative to the Atchafalaya and offshore activities, he concluded that the sandier soils in the subject offshore areas would likely pose less of a problem than did the Lake Pontchartrain soils after they were dredged. He also spent some time explaining how trawlers have in the past and will continue to manipulate the way their trawl boards travel over dredged water bottoms to reduce the problems associated with bumpy bottoms. His comments lead us to believe that cuts may diminish "fishability", but not significantly. Additional economic studies, therefore, would not appear to be warranted.

that is unavailable for commercial harvest. The draft EIS must include an economic evaluation of the impact of removing this acreage from available harvest for the complete length of time that is required for the re-establishment of pre-dredged conditions (including the complete re-establishment of the benthic community).

The economic analyses which have been performed in support of the proposed dredging operations utilize selective data which biases the final analysis. In establishing the economic impact of the oyster dredging industry (subsections 3.7.1.1 and 3.7.1.2), the draft EIS uses an annual production of 1.6 MCY of reef shell (from Barnett, 1990), an estimated price of shell at \$10.33 per yard, and a multiplier factor of three. The annual harvest of 1.6 MCY is valued at \$16,528,000 and results in an annual economic effect of \$63,900,000.

However in another section, the draft EIS acknowledges that shell production has declined due to "[t]he economic fluctuation along the Gulf Coast, further regulation of the industry, and market forces making alternative materials competitive with shell." In fact, in 1992 total shell production was only 350,600 CY. Using this more recent figure, the annual harvest would be valued at only \$3,621,698 and the annual economic effect would be limited to a mere \$10,865,094. This represents a significant difference when considered relative to the true economic impact of removing this acreage from the commercial fisheries harvest for an extended period of time.

The final EIS must include more reasonable economic analyses of the economic value of the oyster shell dredging industry and the true economic impact to the commercial and recreational fishing industries. The draft EIS acknowledges that reasonably available alternatives exist for all uses of dredged oyster shells with the possible exception of oyster cultch. The determination on whether or not to issue this permit must consider the extensive environmental degradation associated with this industry in light for the lack of need for the industry's product.

Sincerely,



Jeff Waters
Staff Scientist

cc: Terrebonne Fisherman Organization
League of Woman Voters

THIS PAGE LEFT BLANK

Fred Kyle
P. O. Box 940
Franklin, LA 70538

May 24, 1993

District Engineer
Attention: CELMNPD-RS
U. S. Engineer District
P. O. Box 60267
New Orleans, LA 70160-0267

Dear Sir:

I write in regard to what I consider to be serious deficiencies in the shell dredging program now in progress in St. Mary and Iberia Parishes.

One deficiency involves the lack of an adequate monitoring program of dredge operations. Another is lack of a program to protect exposed oyster and clam reefs from destruction by unrestricted tug and barge travel.

First - need for a monitoring program controlled preferably by the Louisiana Department of Wildlife and Fisheries.

In the present and proposed dredging areas are many exposed oyster and clam reefs. No one (Repeat No one) in any branch of government - Federal - State- Parish knows how many reefs exist or where they are located. Hence if the dredgers so choose they can remove all reefs without anyone knowing it. In business one does not give a stranger a key to the business. There must be a system of check and balance.

Concern Number two - unrestricted daily travel by tugs and barges. Once again, unfortunately, no person on these vessels knows where the reefs are located. In addition there are no requirements that they stay a set distance from a reef as is the dredge. These are deep draft steel vessels with enough power to grind through reefs. As they travel haphazard routes between dredge and barges their propellers are constantly spewing shells and mud. It is worse when the tug ties on to a loaded barge. The tug swings back and forth on a rope as the barge inches forward. Any reef in any of the travel paths becomes dead shell buried in a bed of muck.

As operated now these tugs and barges will cause far more damage to reefs than the dredge.

Response to Mr. Fred Kyle, Letter dated May 24, 1993

Your comment about monitoring to avoid dredging exposed shells is noted. The application we received included a voluntarily restriction to avoid dredging exposed shells as well as a commitment to abide by monitoring controls set forth in the already-issued Louisiana Coastal Use Permit. Our analysis was conducted accordingly.

NOTE: See page S-1 for an expanded discussion of the proposed action and Appendix A which includes the several restrictions the applicant has imposed upon himself. We believe that explanation addresses your concern.

Your concern about the effects of the movements of support vessels is noted. Unintended actions of the kind you describe are not subject to our regulatory authority and are not part of the activity proposed by the permit applicant. However, intentional actions of support vessels to provide access (e.g., prop washing) would be subject to our regulatory authority but are not part of the proposed activity. If the requested permit is issued and any such intentional activity becomes necessary or occurs, it would be subject to our regulatory authority. Please see our comments at Response to Mr. Harold Schoeffler, letter dated May 27, 1993 (see page F-17), about what would happen in such a case.

District Engineer
May 24, 1993
Page -2-

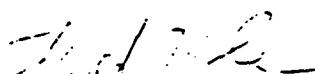
They must be made to follow staked channels away from the reefs.

The comments on propeller damage to reefs are based on personal observation by the undersigned.

I find it ironic that while our natural reefs are being destroyed the state is engaged in a reef building program.

Please note that supporters of dredging at the Morgan City meeting were benefitting financially from the dredging program. They showed no concern for preservation of the reefs.

Yours truly,



Fred. Kyle

THIS PAGE LEFT BLANK

TERREBONNE FISHERMAN ORGANIZATION

President: Donald J. Lirette
 5347 Grand Calibou Road
 Dulac, Louisiana 70353




Telephone
 (504)563-7009

APRIL 5, 1993

DISTRICT ENGINEER
 ATTN: CELMN-PD-RS
 U.S. ARMY ENGINEER DISTRICT
 P.O. BOX 60267
 NEW ORLEANS, LOUISIANA 70160-0267

DEAR SIR:

I HAVE JUST RECEIVED A COPY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT ON OYSTER SHELL DREDGING IN GULF OF MEXICO WATERS, ST. MARY AND TERREBONNE PARISHES LOUISIANA. I HAVE REVIEWED IT AND I AM APPALED THAT ALL THE EFFECTS OF SHELL DREDGING HAVE NOT BEEN ADDRESSED IN THE DRAFT. IT IS VERY LACKING AND I WOULD LIKE TO ALSO POINT OUT AT LEAST ONE CONTRADICTION.

FIRST OF ALL I BELIEVE THIS DRAFT WAS PREPARED BY SOMEONE WHO PROBABLY HAS NOT STUDIED THE HISTORICAL USE OF THE ATACHAFALAYA BASIN. I HAVE BEEN SHRIMPING THIS AREA FOR OVER THIRTY YEARS AND THE PROPOSED ACTIVITY WOULD DESTROY A VERY VALUABLE HABITAT FOR SHRIMP, FLOUNDERS, AND MANY OTHER SPECIES THAT ARE HARVESTED BY COMMERCIAL AND RECREATIONAL FISHERMEN. THIS AREA SUPPORTS A VERY VALUABLE WHITE SHRIMP FISHERY AND ALSO AS VALUABLE SEABOB SHRIMP FISHERY. BLUE CRABS ARE ALSO FISHED IN THIS PRODUCTIVE AREA AND THIS WOULD CAUSE A SIGNIFICANT ECONOMIC IMPACT ON THIS FISHERY ALSO.

THE AREA ALSO IS UNIQUE AS IT IS THE ONLY AREA THAT THERE IS ACTIVE DELTA BUILDING HAPPENING IN THE ENTIRE STATE. THE DELTA BUILT UP WELL OVER THE PAST SEVERAL YEARS AND IF SHELL DREDGING IS ALLOWED IN THIS AREA I BELIEVE THAT LOSS OF THE COASTLINE IS IMMINENT. THIS WOULD BE COUNTER PRODUCTIVE TO THE EFFORTS OF MANY WHO ARE TRYING TO PROTECT WHAT FRAGILE COASTAL ECOSYSTEMS WE HAVE LEFT. THIS AREA ACTS AS A SHOAL AREA IMM SURE AND BUFFERS THE IMPACTS OF THE WAVE ENERGY IN THE AREA THAT PROTECT THE VALUABLE BARRIER REEFS. THESE REEFS ARE SUBSIDING BECAUSE OF THE EXTRACTION OF OIL AND GAS AND THIS FURTHER DESTRUCTION WILL ONLY COMPOUND THE PROBLEM.

I WOULD LIKE TO ALSO MENTION THAT THERE IS ALSO A WRECK OF A STEAM-BOAT ABOUT A MILE OFF WHAT IS KNOWN AS "BLUE POINT" IN THE EASTERN MOST SECTION OF THIS AREA. THIS STEAMBOAT WAS SUNK DURING THE GREAT HURRICANE THAT DEVASTATED LAST ISLAND IN THE 1800's AND IS TALKED ABOUT IN THE BOOK LAST ISLAND WRITTEN BY JAMES SOUTHERN. THIS WRECK IS OF HISTORICAL VALUE TO THE PEOPLE OF THE AREA AND I BELIEVE IT SHOULD BE LEFT ALONE. PEOPLE DIED IN THE HURRICANE AND SHOULD BE LEFT ALONE TO REST IN PEACE.

THE EFFECTS OF SHELL DREDGING INSIDE OF THE BARRIER REEFS JUST INSIDE THIS AREA WAS NOT ADAQUETLY ADDRESSED ALSO. THERE WERE LARGE HOLES LEFT ON THE BOTTOM AND WERE IT NOT FOR THE SEDIMENT DEPOSITED QUICKLY BY THE RIVER. IT WOULD BE MANY YEARS BEFORE SHRIMPERS WOULD BE ABLE



Terrebonne Fisherman Organization, Letter dated April 5, 1993

Comment noted.

Dredging for shells in the Atchafalaya Basin is not part of the subject permit action/DEIS.

Shell dredging would not "....destroy...." (i.e., eliminate) water bottoms (see our comments at Response to Mr. Harold Schoeffler, letter dated May 27, 1993 (see page F-17). Furthermore, and to the contrary, exposed shells, which we believe are very valuable to the fishery resources of the area, are protected from dredging. The EIS (Section 3.6.2.1.2.) addressees the impacts shell dredging would have on commercial and recreational fishing.

Please see response to Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company, letter dated May 12, 1993 (see page F-5), Impact on Delta Building Processes (See page F-7).

As stated in EIS section 3.8.2.1., we are aware that historic shipwrecks are likely to exist in the permit area. For this reason, a multi-phased shipwreck identification and avoidance program should implemented as a permit condition. See EIS Section 3.8.2.2. for additional discussion.

We assessed the impacts of shell dredging in coastal bays in a prior environmental impact statement. And, we agree that because dredged areas fill-in rapidly with sediment, impacts to commercial and recreational fishing would be minor and short-term. We believe the EIS properly acknowledges the existence of alternative materials (Table 1), discusses the constraints on the use of those materials (EIS Section 2) and informs the reader that there are situations where the use of alternative materials has, and by inference, can and should be expected to arise (EIS Section 2).



TERREBONNE FISHERMAN ORGANIZATION

President : Donald J Lirette
5347 Grand Caillou Road
Dulac, Louisiana 70353

Telephone
(504)563-7005

OYSTER SHELL DREDGING CONTINUED:

TO FISH THE AREA WHICH WOULD JUST ALLOCATE THE ECONOMIC BENEFIT OF HARVESTING NATURAL RESOURCES FROM ONE USER GROUP TO ANOTHER. FISHERMEN ARE HARVESTING THERE NOW WITH NO ENVIRONMENTAL IMPACT WHY THEN WOULD YOU ALLOW SOMEONE TO DESTROY THIS CRITICAL HABITAT WHEN THERE ARE OTHER MATERIALS AVAILABLE TO REPLACE OYSTER SHELLS THAT ARE MINED WITH LESS DAMAGE TO THE ENVIRONMENT?

THE CONTRADICTION THAT I REFERRED TO PREVIOUSLY PLEASE REFERENCE LAST PAGE OF THE DRAFT WHICH IS A LETTER FROM CHARLES ORAVETZ. CHIEF OF THE PROTECTED SPECIES BRANCH, NMFS. THIS LETTER DISTURBS ME. THIS IS A CLASSIC EXAMPLE OF DOUBLE STANDARDS THAT THE FEDERAL GOVT. IS NOTORIOUS FOR. THE IMPACTS OF SHELL DREDGING WILL IMPACT TURTLES AND OTHER MARINE LIFE AND HE KNOWS IT. SHRIMPERS HAVE TO PUT TURTLE EXCLUDER DEVICES IN THEIR NETS TO FISH THE AREA BECAUSE THEY MAY ENCOUNTER A TURTLE. INCIDENTAL CATCH OF A TURTLE CANNOT BE ALLOWED WHICH GAVE HIM WHAT HE BELIEVES JUSTIFICATION TO EXPAND THE TURTLE REGULATIONS TO INCLUDE INSIDE WATERS NOW. I BELIEVE THAT IF INCIDENTAL CATCH IS NOT ALLOWED IN THE SHRIMPING INDUSTRY THEN YOU SHOULD NOT ALLOW THE DANGER OF CUTTERHEADS AND VESSEL ACTIVITY IN THIS SHALLOW AREA TO KILL ENDANGERED TURTLES. I BELIEVE ALLOWING DREDGING FOR SHELL IN THE AREA WOULD OPEN THE DOOR FOR LITIGATION CHALLENGING THE USE OF TED'S YEAR ROUND JUST BECAUSE OF THE POSSIBILITY OF AN INCIDENTAL CAPTURE OF A TURTLE. REMEMBER NOT ALL, IF ANY TURTLES CAUGHT ARE DROWNED BUT HARDLY ANY ESCAPE ALIVE FROM A CUTTER HEAD.

IN CLOSING I WOULD SAY THE DRAFT NEEDS A LOT MORE WORK AND NEEDS TO LOOK AT ALL ENVIRONMENTAL IMPACTS WITHOUT BIAS. THIS WILL GIVE US A GOOD TRUE DOCUMENT THAT WILL HELP YOU MAKE A DETERMINATION BASED ON GOOD SCIENCE RATHER THAN MOSTLY POLITICAL VIEWPOINTS. I TRUST THAT YOU WILL ASK FOR THIS TO BE DONE AND MAKE A JUST DECISION. THANK YOU FOR THE OPPORTUNITY TO COMMENT AND AS ALWAYS OUR ORGANIZATION IS ALWAYS WILLING TO HELP PRESERVE THE FRAGILE ECOSYSTEMS WE ALL ENJOY.

SINCERELY,

DONALD J. LIRETTE /PRESIDENT



CLAM



OYSTER



REDFISH



SHRIMP



SHARK



SPOTTED SEA TROUT



CATFISH

Terrebonne Fisherman Organization, Letter dated April 5, 1993 (continued)

We note your opinion that shrimpers are unfairly burdened with having to use turtle excluder devices (TEDS) while dredgers are not. However, we do not think that the two activities pose roughly identical "threats" to sea turtles, as your opinion implies. Our evaluation of the available information resulted in a different impression. Turtles can't out swim shrimpers' trawl nets. But, a shell dredge moves on the order of 200 feet a day, much more slowly than a turtle can swim. Turtles are behaviorally inclined to stay clear of primarily localized turbid water situations that typically envelop a shell dredging operation. No similar behavioral avoidance stimulus is related to shrimp trawls.

Your summary comments are noted.

CHARLES A. DENECHAUD (1981-1986)
CHARLES A. DENECHAUD, JR.
THOMAS A. RAYER
CHARLES L. DENECHAUD, III
TG S. SCHOENFELD
EDWARD B. DENECHAUD
DWRENCE J. SPRINGER
JN M. RICHARD

DENECHAUD AND DENECHAUD
ATTORNEYS AND COUNSELLORS AT LAW
1612 PERE MARQUETTE BUILDING
NEW ORLEANS, LOUISIANA 70112-2385

(504) 522-4756
FAX (504) 568-0783

May 21, 1993

Planning Division
ATTN: CELMN-PD-RS
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: OF 4941 - Point au Fer Island -
Reef Shell Permit SW (Gulf of Mexico) 3559

Gentlemen:

I enclose herewith copy of self-explanatory letter that I forwarded to Mr. Albert J. Guillot, Chief of Operations and Readiness Division, Corps of Engineers, under date of May 6, 1993. This letter will serve to advise that the landowners of Point au Fer Island have entered into an agreement with Louisiana Dredging company, which company currently holds a lease with the Louisiana Department of Wildlife and Fisheries for the purpose of removing buried reef shell from areas of Atchafalaya and East Cote Blanche Bays in St. Mary and Terrebonne Parishes.

Louisiana Dredging Company has agreed that it will not conduct dredging operations within one mile of the existing coastline of Point au Fer Island within Zone 9 of the leased area.

Based on the aforementioned agreement, the landowners of Point au Fer Island have no objection to the permit application of Louisiana Dredging Company to conduct dredging operations in certain parts of the leased area referred to as Zones 8 and 9.

Very truly yours,

DENECHAUD AND DENECHAUD

Charles A. Denechaud, III

CID, III/bdn
Enclosure

cc Mr. John M. Smyth
Mr. Joseph E. Ingraham
Louisiana Dredging Company
Mr. Gerard M. LeBlanc

Letters of No Objection

Denechaud and Denechaud, letter dated May 21, 1993

NOTE: This letter also withdraws an earlier objection.

Letters of Support

Many expressions of support for shell dredging were received. Perceived favorable economic impacts or engineering considerations were the most often cited reasons. They do not require rebuttal or explanation. Accordingly, we acknowledge these comments and will simply list them.

Received Prior to the May 18, 1993 Public Hearing

Alfa Flour Inc., letters dated May 4 & 7, 1993
St. Mary Industrial Group, resolution dated May 10, 1993
H. M. Royal, Inc., letter dated May 7, 1993
McDonough Marine Service, letter dated May 11, 1993
Paul Dee Company, letter dated May 11, 1993
Lalande Towing, letter dated May 10, 1993
Service Marine Industries, Inc., letter undated
Blanchard's Engine Specialists, Inc., letter dated May 10, 1993
Gary L. Salmon, letter dated April 29, 1993
John Siracusa, LA State Rep. Dist. 51, letter dated May 5, 1993

Received at the Public Hearing or During the Public Hearing Comment Period

Mr. Jesse Fontenot, letter postmarked May 18, 1993
Marion Merrell Dow Inc., letter dated May 20, 1993
Orto Contractors Inc., letter dated May 18, 1993
T. L. James & Company, letter dated May 18, 1993
Crewboats, Inc., letter (dated May 19, 1993) transmitting 29 form letters
Crosby Tugs, Inc., undated submittal of 7 form letters
City of Morgan City, Council Resolution, dated May 25, 1993

Written Submittals from the May 18, 1993 Public Hearing

St. Mary Parish Council, Resolution
East St. Mary Area Chamber of Commerce, Resolution
Lake Charles Dredging and Towing Company, Inc., letter
J. R. Gray, Inc., letter
Dixie Shipyard, letter
Terrebonne Parish Council, Resolution
St. Mary Industrial Group, Resolution
Mr. James R. Brabret, letter
Mr. Bud Lange, letter
Mr. William T. Clark, Jr., letter
Mr. Dean C. Raker(?), letter
Mr. Clifford ?, letter
Mr. Walter Wilbur, letter
Mr. ? B. Bobbi?, letter
Mr. Dwayne R. McLim, letter
Nalisha, Jamie, Sabin and Henry J. Wilbur, letter
Mr. Dwight C. Brannon, letter
Mr. Marvin J. Dinger, letter
Mr. Michael Estelle, letter
Mr. Bryant Jerman, letter
Mr. Bruce E. Clements, Sr., letter
Mr. Elias Ramirez, Jr., letter
Mr. David A. Barrett, letter
Mr. Ted F. Brannon (?), letter
American Supply Co., letter
Lakeside Grocery, Inc., letter
Form Letters (613) from individuals in the dredging and related industries

Testimony from May 18, 1993 Public Hearing

Supportive

Mr. Howson, read letter of support on behalf of LA Representative John Siracusa
Mr. Hernandez, read two resolutions of support (East St. Mary Chamber of Commerce, St. Mary Parish Council)
Mr. Gilley (Lake Charles Dredging and Towing), spoke in support
Mr. Jimmy Brabner, submitted multiple form letters in support of the requested
Mr. Hopson (Hopson Towing Company), spoke in support of the requested permit
Mr. Bud Lange (Louisiana Dredging), submitted multiple form letters from family members of Louisiana Dredging Company's employees
Mr. Fred Kyle, expressed concern about monitoring and boat traffic. See rebuttal to his letter dated May 24, 1993.
Mr. Milner (Coastal Bridge Company) expressed support for requested permit
Mr. Wayne Harper, read a resolution of support from the Terrebonne Parish Council
Mr. Doyle Berry, spoke in support of the requested permit
Mr. Jerry LeBlanc, spoke in support of the requested permit
Mr. Mike Vanover, read a resolution of support from the St. Mary Industrial Group.
Mr. Moore (Southern Magic Fabrication) spoke in support of the requested permit

Opposed

Mr. Clyde Deslatte, concerned about the effects of shell dredging on coastal erosion.

Please see our comments at Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company, letter dated May 12, 1993, Impact on Hydrology, Tides and Wave Energies. (see page F-5)

Ms. Linda Dittsworth, landowner representative for St. Mary Land & Exploration Company, expressed concern about the effects of shell dredging on erosion along northern rim of Atchafalaya and East Cote Blanche Bays.

Please see our comments at Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company, letter dated May 12, 1993.



U.S. Department of Housing and Urban Development

Fort Worth Regional Office, Region VI
1600 Throckmorton
P. O. Box 2905
Fort Worth, Texas 76113-2905

April 14, 1993

District Engineer
ATTENTION: CELMN-PD-RS
U.S. Army Engineer District
PO Box 60267
New Orleans, LA 70160-0267

Sir:

SUBJECT: Draft Environmental Impact Statement
Oyster Shell Dredging in Gulf of Mexico Waters
St. Mary and Terrebonne Parishes, Louisiana

The subject Draft EIS has been reviewed by our New Orleans Office.

The dredging of Oyster Shell under the Rivers and Harbors Act is not expected to have an impact upon any ongoing HUD approved activities or programs.

The Department has no statutory responsibility, agency mission, or special expertise in the proposed dredging. It submits a "no comment" reply as per section 1503.2 of Council on Environmental Quality regulations.

We appreciate the opportunity of reviewing the subject Draft EIS.

Sincerely,

I.J. Ramsbottom
Environmental Clearance Officer

FEDERAL AGENCIES:

US Department of Housing and Urban Development, submitted a "No Comment" letter dated April 14, 1993



DEPARTMENT OF THE ARMY
LOWER MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P. O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO
ATTENTION OF

CELMV-PD-R (1105-2-10c)

24 May 1993

MEMORANDUM FOR Commander, New Orleans District, ATTN: CELMN-PD-RS

SUBJECT: Draft Environmental Impact Statement and Appendixes for Oyster Shell Dredging in Gulf of Mexico Waters, St. Mary and Terrebonne Parishes, Louisiana.

1. Reference CELMN-PD-RS memorandum, 29 March 1993, subject as above.

2. General. The Draft Environmental Impact Statement is generally well written and comprehensive in coverage. The following comments are presented to clarify and assist in understanding the impacts to the proposal.

a. Alternatives. Excluding the No Action Plan, only one alternative evaluating zones 8 and 9 was described. It is unclear why zones 6 and 7 which are adjacent to zones 8 and 9 were not evaluated. Clarification should be provided.

b. Mitigation. Based on a removal rate of 1.6 million cubic yards annually, up to eight acres of reef could be needed annually to meet the mitigation requirement discussed in the DEIS. The DEIS states that only one acre of reef has been built. More detail should be provided regarding what triggers the need to build shell reef as mitigation or why only one acre has been constructed thus far considering that shell removal has occurred for several years since the mitigation requirement has been in effect.

c. Page EIS-29, paragraph 3.3.3., Subsidence and Land Loss. Additional discussion of possible effects on the land accretion process along parts of the Chenier Plain area should be added in this paragraph or elsewhere as appropriate. The potential of any short-term reduction of transport of material to this area if sediments are trapped in dredged cuts to the east should be discussed.

d. Page EIS-118, second paragraph. The feasibility Report/EIS referenced in this paragraph was suspended in May 1992, until such time that the long-term plan and impacts for operation of the Wax Lake Structure are confirmed.

FOR THE COMMANDER:

JAMES R. HANCHEY
Director of Planning

Responses to USACE, Vicksburg Division, MEMO dated 24 May 1993

- 2a. Comment noted. Zones 6 and 7 are no longer part of state lease that forms basis for this permit request.
- 2b. Comment noted and text of EIS amended at Section S-4.
- 2c. Clarification of the text has been added in Sections 3.3.3.1. and 3.3.4.2.
- 2d. Comment noted and text amended. Also please see our Response to USEPA letter dated July 2, 1993. (see page F-61)



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9450 Koger Boulevard
St. Petersburg, Florida 33702

May 7, 1993

Colonel Michael Diffley
District Engineer, New Orleans District
ATTN: CELMN-PD-RS
Department of the Army, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Diffley:

The National Marine Fisheries Service has reviewed the April 1993 Draft Environmental Impact Statement (DEIS) for Oyster Shell Dredging in Gulf of Mexico Waters, St. Mary and Terrebonne Parishes, Louisiana. The following comments are provided for your consideration:

General Comments

The DEIS does not adequately address the impacts of shell dredging in the Gulf of Mexico south of Atchafalaya Bay. While more than 50,000 acres of waterbottoms could be impacted by dredging, the DEIS concludes that shell dredging will not have significant adverse impacts because only a small area will be impacted on a daily basis. This conclusion is unsupported because the DEIS does not provide a sufficient analysis of the cumulative impacts of the proposed project, or of project impacts in combination with activities that are currently occurring in that portion of the Gulf of Mexico. Furthermore, adequate consideration was not given to potential dredging-induced impacts to the shoreline of Point au Fer Island.

Specific Comments

S. SUMMARY

S.2. SUMMARY OF MAJOR ALTERNATIVES

Page S-3, paragraph 3.

This section should be expanded to include alternatives that would lessen project impacts while allowing shell dredging to continue. See the comments related to DEIS Section 2. ALTERNATIVES, Issue Permits with Additional Restrictions, page EIS-17.



National Marine Fisheries Service, letter dated May 7, 1993

General Comments. We note the reasons for your comment that the EIS is inadequate. Your specifically cited reasons are: 1) impacts would be limited to small areas on a daily basis; 2) cumulative impacts were poorly developed; and, 3) impacts of dredging to Point au Fer Island were not adequately addressed.

Impacts to Point au Fer Island - The Louisiana Department of Wildlife and Fisheries has determined the boundaries of the area in the nearshore GOM subject to shell dredging. That state agency has not excluded areas in close proximity to Point au Fer Island that concern you. The New Orleans District is not in a position to change the state-determined lease boundaries. (See our comments at Response to Mr. Harold Schoeflfer, letter dated May 27, 1993 (see page F-17)).

However, the applicant has voluntarily modified the permit request to provide for a one-mile wide nondredge area gulfward of the Point au Fer Island shoreline. The agreement was reached on May 20, 1993. The description of the proposed action has been changed accordingly. Whether this agreement is specifically included as a condition to any Federal permit will depend upon the results of the Section 404 (b) (1) evaluation and the public interest review.

Cumulative Impacts - We believe the EIS has identified and addressed the foreseeable cumulative impacts.

Area and Duration of Impacts - Based upon our summary presentation of our conclusions (pages S-4 through S-10), we have determined that anticipated impacts would be localized and short-term. We don't agree with you that such a conclusion makes the EIS inadequate.

Specific Comments

Page S-3, para 3 (and Page EIS-17): Your comment is noted. We have amended the text of the EIS Section S.1. to more accurately reflect the entirety of the proposed action. Section EIS 2.2.2. has also been amended to reflect the possibility of the imposition of additional permit conditions.

S.3. SUMMARY OF ENVIRONMENTAL IMPACTS

S.3.2. Summary of Physical Impacts

S.3.2.2. Summary of Geological Impacts

Pages S-4 and 5.

This summary should be expanded to include comments related to impacts to delta and shoreline accretion. See Section 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES, Alternative 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9, page EIS-35.

S.3.2.3. Summary of Hydrological Impacts

Page S-5, paragraph 3.

This summary should be expanded to include possible impacts to Point au Fer Island and on shoreline erosion in areas influenced by Atchafalaya River discharges. See comments regarding Section 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES, Alternative 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9, page EIS-46.

S.3.2.4. Summary of Water Quality Impacts

Pages S-5 and 6.

This summary should include a discussion of the potential synergistic effect of project related impacts on water quality. See comments regarding Section 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES, Alternative 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9, page EIS-61.

S.3.3. Summary of Biological Impacts

S.3.3.1. Algae and Phytoplankton

Page S-7, paragraph 1.

This summary should be expanded to include our comments regarding impacts to algae and phytoplankton in Section 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES, Alternative 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9, page EIS-66.

S.3.3.2. Fisheries/Nekton

Page S-7, paragraph 2.

This summary should further address the impacts of the reintroduction of toxic contaminants to the water column as outlined in our comments concerning Section 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES, Alternative 1 Applicant's Preferred Alternative Dredging in Portions of Zones 8 and 9, page EIS-71.

S.3.3.3. Benthos

Pages S-7 and 8.

This summary should address the potentially additive or synergistic effects on growth and reproduction of benthic fauna following exposure to high turbidity and toxic contaminants. See our comments related to Section 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES, Alternative 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9, pages EIS-75 and 76.

Pages S-4 and S-5 (and Page EIS-35): Your comment is noted. We included a statement in the summary section about the impact of shell dredging on shoreline accretion that extends the original text that addressed the effects on deltas. EIS Section 3.3.4.2. has also been amended to clarify the impacts of shell dredging on land accretion. Also please see the Response to Mr. Harold Schoeffler, letter dated May 27, 1993 for a discussion of the subject. (see page F-17)

Page S-5, para 3 (and Page EIS 46): See our response at General Comments, Impacts to Point au Fer Island.

Pages S-5 and S-6 (and Page EIS-61):

EIS Section 3.5.3. contains a discussion of low dissolved oxygen levels in the holes left by shell dredging. This section also discusses the increase in turbidity and results of the elutriate testing in nearby sediment. Turbidity increases are temporary and localized. Sediment elutriate testing revealed that the release of sediment-associated contaminants does not pose a significant hazard to the environment.

Two of the three identified shell deposits do not abut or overlap oil/gas production areas, and in both instances are no closer than several thousand feet. As for the third shell deposit, only the extreme northwestern corner overlaps a oil/gas production area.

We think that if any additional contaminant testing is to be required, it should be specific to the location where the potential increases for the effects you cite. We believe that the only area within the oil/gas producing area with the potential for shell dredging to affect water quality is in close proximity to the produced water discharge from the field. The Eugene Island Field has a single produced water discharge which has remained in the same place as best we can determine since the 1950's. Sediment contaminants from produced water discharges in similar shallow water situations didn't extend more than 300m from the source of the discharge. (Lake Peito field Neff *et al.*, 1989), West Bay, Bay de Chene, and Delacroix Island (Steinle and Associates, Inc., 1991). Increased area of effect from produced water discharges has been observed in canal discharge situations (Boesch and Rabalais, 1989).

The administrative solution would be to consider a condition to eliminate dredging within an approximately 300m radius of such produced water discharges. The basis for and merits of any such special permit condition would be determined pursuant to the Section 404 (b) (1) evaluation.

Independent magnetometer surveys which are conducted and submitted to the state prior to any shell dredging activities in an area will locate any pipelines or impediments to shell dredging. Shell dredging is not conducted in close proximity to oilfield operations such as wells and pipelines for obvious safety reasons.

The anoxic bottom zone which seasonally occurs off of the Louisiana coast forms over large areas of the inner continental shelf (5 to 50m water depth). The presence of hypoxic bottom water is most prevalent between May and September and is irregularly distributed in both time and space. The potential for shell dredging to affect the extent or duration of this hypoxic zone is minuscule.

Page S-7 (and Page EIS-66):

Para 1 - Although there is the potential for contaminant impacts to occur, we have no data to indicate that release of toxics from the sediments will occur as a result of shell dredging in the project area. Elutriate testing has been conducted only along the Atchafalaya Bay Navigation Channel and not in proximity to oilfield discharges, the only other known area with the potential to have contaminants within the sediments. Please reference the discussion above.

Para 2 - The EIS text has been amended to clearly say that "...less than 9 acres of the project area...." is a daily rate.

Page S-7 (and Page EIS-71):

The EIS has found that turbidity effects which result from shell dredging are temporary and localized. Low dissolved oxygen levels which may form in dredge cuts are temporary in nature (and rapidly fill with sediment) are seasonal if they form at all. The presence of contaminants at levels of concern in any sediments in the project area has not been demonstrated. Therefore, we feel that the probability of a problem caused by contamination impacts on significant populations of benthos or nekton is very small.

Pages S7-8. Please reference the discussion above on Page S-7

S.3.5. Summary of Cumulative Impacts

Page S-10.

This discussion needs to be expanded to include the possible additive effects of the activities currently taking place in the proposed shell dredging area. Additionally, the DEIS should provide a discussion of the potentially synergistic effects of the proposed activity above that of activities currently taking place in the project area.

S.4. SUMMARY OF MITIGATION MEASURES

Pages S-10 and 11.

This section should be expanded to include a summary of mitigation success, including any monitoring of benthic invertebrates and other fishery organisms that populate the mitigation reef. Additionally, this section should include a mitigation proposal that addresses compensation for unavoidable adverse impacts associated with shell dredging. Any planned mitigation should be coordinated with the NMFS and other natural resource agencies.

2. ALTERNATIVES

2.2. DESCRIPTION OF ALTERNATIVES

2.2.3. Issue Permits with Additional Restrictions

Page EIS-17.

This section should be revised to include a new subsection 2.2.3.3. "Additional Restrictions on Areas Available for Shell Dredging." This subsection should address the potential benefits of increasing the width of the no dredging zones along the coast of Point au Fer Island and restricting maximum depth for shell dredging. Emphasis should be placed on shoreline erosion rates and patterns and potential impacts to wetlands if shoreline breaching occurs. This assessment is especially important since federal and state funds are being expended under the Coastal Wetlands Planning, Protection, and Restoration Act to protect Point au Fer wetlands.

2.2.3.2. Additional Restrictions on Dredging Discharge

Pages EIS-17 and 18.

This section should be expanded to include consideration of monitoring the water quality of shell dredging discharges to determine if contaminants are released and if the discharge complies with EPA regulations.

2.4. COMPARATIVE IMPACTS OF ALTERNATIVES

TABLE 2 COMPARATIVE IMPACTS OF ALTERNATIVES

Pages EIS-22 through 24.

Please reference our comments addressing specific subsections of Section 3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES, pages EIS-25 through 76. Also, the summary under Resource/Issue--Water column water/sediment quality-contaminants/physical characteristics--Applicant's Proposal Alternative 1 states that the "release of any contaminants from sediment settles back into holes." This statement is not in agreement with paragraph 4, page EIS-60 that summarizes a Corps of Engineers sediment study which found that "trace metals were released into the water column following disturbance." If contaminants were released from the

Page S-10. Please reference the discussion of Cumulative Impacts.

Page S-10 and 11. The mitigation section has been amended. Also reference Responses to Environmental Protection Agency, letter dated July 2, 1993 (see page F-61).

Page EIS-17. Please reference discussion in Responses to National Marine Fisheries Service, letter dated May 26, 1993 (see Page F-57).

Pages EIS-17 and 18. Please reference the discussion about pages S-5 and S-6.

Table 2. The text has been amended to correct a typographical error.

sediments, they would enter the water column and may not return to the cut with the bulk of the dredged material. Therefore, this section should be revised to account for the potential release of contaminants into the water column as indicated on page EIS-60. Alternatively, additional scientific information should be provided to support this statement.

The paragraph under Resource/Issue--Phytoplankton--Applicant's Proposal Alternative 1 should be revised to include a statement that contaminants could be released from sediments, resulting in uptake by phytoplankton and reduced phytoplanktonic productivity.

Under Resource/Issue--Fisheries--Applicant's Proposal Alternative 1 the paragraph should be revised to include a statement that toxic contaminants that could be released during dredging could adversely impact the growth and survival of larval and adult crustaceans and finfish.

3. EXISTING CONDITIONS AND IMPACTS OF ALTERNATIVES

3.3. GEOLOGICAL SETTING

3.3.3. Subsidence and Land Loss

3.3.3.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9.

Page EIS-35, paragraph 1.

The statement that shell dredging is not expected to have any impact on land loss should be supported by scientific data that provide estimates of the total borrow areas created by mining and the amount of sediment required to return the area to preproject elevations. Additionally, we are concerned that the material would be naturally diverted to fill borrow areas and would reduce the amount of material that is currently being deposited along the Marsh Island and eastern Chenier Plain shorelines. The south shore of Marsh Island and portions of the Chenier Plain are among the few actively accreting shoreline areas along Louisiana's Gulf coast. Documentation should be included that demonstrates the proposed shell dredging will not significantly impact the rate of shoreline accretion in downdrift areas.

3.3.4. Holes and Troughs

3.3.4.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9.

Page EIS-46, paragraph 1.

This paragraph should be revised to include possible impacts to the Point au Fer Island shoreline that may result from creating deep pits in the nearshore area. Because of the east to west nearshore circulation pattern, less river borne sediments reach these areas and dredged cuts would be much slower to fill. The creation of holes and pits in the nearshore area would reduce the natural, gradual slope of the nearshore area leading to the island and could

Page EIS-35. Please see our expanded discussion of Section 3.3.4.2.

**Page EIS-46. Please reference the discussion of Point Au Fer and in the Response to
National Marine Fisheries Service, letter dated May 26, 1993 (see page F-57).**

increase wave energy and shoreline erosion. Such an increase in shoreline erosion rates, as a result of nearshore dredging, has been documented at Grand Isle, Louisiana, following the excavation of borrow pits gulfward of the island. Information should be included that demonstrates the impacts of deep, nearshore pits on shoreline erosion at Point au Fer Island.

3.5. HYDROLOGY AND WATER QUALITY

3.5.3. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9.

Pages EIS-61 through 64.

This section should include a discussion of reduced dissolved oxygen levels that may occur when logs and other organic debris collect in dredged holes. This section also should include a discussion of the potentially synergistic effects of high turbidity and the release of contaminants on water quality. The DEIS also should address whether dredging activities would meet EPA water quality criteria requirements if toxic contaminants are released during shell recovery. Additionally, this section should discuss the increased potential for encountering contaminants during shell dredging operations since the areas where shell deposits have already been identified lie adjacent to existing oil and gas production areas (See Figures 7 and 8 of the DEIS pages EIS-48 and 50). A discussion of the potential impacts of dredging and releasing anoxic or slightly oxygenated sediments on dissolved oxygen levels and the occurrence of anoxic zones in shallow gulf waters is also needed.

3.6. BIOTIC ENVIRONMENT

3.6.1. Botanical Resources

3.6.1.1. Algae and Phytoplankton

3.6.1.1.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9.

Page EIS-66.

This section should be revised to address the potential exposure of phytoplankton to contaminants that could be released into the water column.

Page EIS-66, paragraph 2.

The sentence "Turbidity from shell dredging may affect less than 9 acres of the project area" should be revised to specify the duration of these impacts.

3.6.2. Zoological Resources

3.6.2.1. Fisheries/Nekton

3.6.2.1.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative Dredging in Portions of Zones 8 and 9.

Page EIS-71.

This section should address lethal and chronic impacts of reintroducing contaminants to the water column on eggs, larval and other early life stages of estuarine-dependent fishery organisms that would migrate through these areas to inland nursery and

Pages EIS-61 through 64. Please reference the discussion of EIS-61 on page F-48.

Page EIS-66. Text amended.

Page EIS-66, Paragraph 2. Text amended.

Page EIS-71. Please reference the discussion on page S-7.

nearshore feeding grounds. This should emphasize impacts on planktonic and semi-planktonic forms whose movements are influenced by current patterns and which are unable to avoid high turbidity conditions and dredge entrainment. Finally, the cumulative effects of high turbidity, contaminant releases and organism entrainment on eggs, larvae, and other early life stages of fishery organisms should be addressed.

Page EIS-71, paragraph 2.

This section states that 5.8 acres would be affected by turbidity while subsection 3.6.1.1.2. indicates that 9 acres may be affected by turbidity. The differences in acres impacted should be rectified or the text should be clarified to explain these differences.

3.6.2.2. Benthos

3.6.2.2.2. Impacts of Alternatives

ALTERNATIVE 1 Applicant's Preferred Alternative-Dredging in Portions of Zones 8 and 9.

Pages EIS-75 and 76.

This section should address the synergistic effects of exposure to high turbidity, low dissolved oxygen levels, and contamination on benthic invertebrate survival and recolonization. The presence of toxic constituents and fluid sediments could reduce habitat value, slow recolonization, and alter community structure. The reintroduction of toxic constituents into surrounding sediments could also impact the benthos of adjacent areas and reduce the number and diversity of organisms available to recolonize the dredged cut. The growth and reproduction of surviving organisms may also be reduced.

4. CUMULATIVE IMPACTS

4.6. IMPACTS OF CORPS OF ENGINEERS CIVIL WORKS PROJECTS

Page EIS-118, paragraph 3.

The last sentence should be modified to indicate that the National Marine Fisheries Service also is a coordinating agency which provides comments and recommendations for enhancement of the Atchafalaya River delta.

Thank you for the opportunity to review the DEIS.

Sincerely,



Andreas Mager, Jr.
Assistant Regional Director
Habitat Conservation Division

Page EIS-71, Paragraph 2. The difference is explained in Section 3.5.3.

Pages EIS-75 and 76. Please reference the discussion on S-7 above. We feel that the probability of a problem caused by two or all three factors acting together on significant populations of benthos is also very small.

Comment noted, and acknowledged. NMFS is one of several. We elected not to list any of them.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9450 Koger Boulevard
St. Petersburg, Florida 33702

May 26, 1993 F/SE024/BN:jk
504/389-0508

Colonel Michael Difley
District Engineer, New Orleans District
Department of the Army, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Difley:

The National Marine Fisheries Service (NMFS) has received the April 7, 1993, Special Public Notice Announcement for a Public Hearing concerning LMNOD-SW (Gulf of Mexico)3559. Louisiana Dredging Company proposes to dredge for reef shell in the Gulf of Mexico. The proposed dredging area extends westerly from Point au Fer to Marsh Island and seaward from Atchafalaya and East Cote Blanche Bays to the three mile limit.

Based on the information in the Draft Environmental Impact Statement (DEIS) and our knowledge of dredging activities in coastal waters, we are convinced that shell dredging in the nearshore area of the Gulf of Mexico would adversely impact habitat supportive of NMFS trust resources. Shallow water areas and wetlands, such as those found at Point au Fer and Marsh Island, provide nursery and foraging habitat for numerous economically important fishery organisms including, blue crab, brown and white shrimp, red drum, gulf menhaden, and spotted seatrout. Dredging of these shallow water areas would convert areas from shallow to deep water potentially reducing their fishery habitat values. During dredging operations increases in turbidity, entrainment, and substrate removal would destroy benthic invertebrates and temporarily eliminate the forage base of bottom feeding species. Furthermore, we are concerned that significant secondary impacts could occur as a result of project implementation. These secondary impacts would contribute to losses of emergent wetlands at Point au Fer and Marsh Islands.

Project implementation could adversely impact shoreline erosion rates on Point au Fer Island. Shell dredging in nearshore areas could alter the energy/wave regime and cause increased shoreline erosion. Increased shoreline erosion rates following nearshore dredging have been documented in other areas along the Louisiana coast when borrow pits are excavated too close to the existing shoreline or to too great a depth (Personnel communication, Carol Spraul, New Orleans District, Corps of Engineers). Evidence of increased shoreline erosion rates caused by dredging in the Gulf of Mexico was documented by the New Orleans District in a 1986 Environmental Assessment¹. In that case a borrow pit located approximately 2,000 ft offshore appeared to accelerate beach erosion at Grand Isle. Therefore, it is essential that, if shell dredging is conducted near Point au Fer, the no dredging zone must be sufficient to ensure shoreline erosion rates will not be increased. Also, a maximum depth to which shell resources can be extracted should be established that would prevent the creation of deep pits in nearshore areas which could accelerate shore erosion.

¹New Orleans District, Corps of Engineers, 1986. Environmental Assessment, Grand Isle and Vicinity, Louisiana Beach and Hurricane Protection Restoration. p. 23.



National Marine Fisheries Service, Letter dated May 26, 1993

No dredging will occur in wetlands. The EIS states that shell dredging will have many of the effects you listed.

Point au Fer Island Shoreline

We and the applicant acknowledge your concern about shoreline stability relative to the potential effects of shell dredging when it occurs within a few thousand feet of existing shorelines (see Section 3.3.4.2. Impacts of Alternatives). Accordingly, the applicant has voluntarily signed an agreement to increase the no-dredging zone around Point Au Fer Island to one mile from existing shorelines. If the permit is issued, that agreement can be incorporated into the permit as a special condition. That decision will be based largely upon the Corps' public interest review and Section 404 (b)(1) analysis.

Restriction on depth of dredge cut

Your suggestion of limiting the depth of cut to reduce the potential to create deep pits is noted. However, we do not believe that limiting the depth of cut is necessary. The drawings included with the permit application (and that also appear in this EIS) indicate a proposed depth of cut relative to the mud line. We have based our impact analyses on that information. Should the applicant desire to dredge to a deeper depth, additional analyses would be required. Additionally, dredged sediments are returned to the cut. Once there, they stay put (scouring is not expected). In this sediment-rich environment, cuts fill-in fairly rapidly.

In addition, we are concerned that sediment delivery to, and accretion along, the shorelines of Marsh Island and the eastern Chenier Plain could be reduced following project implementation. The Gulf shoreline of Marsh Island and portions of the Chenier Plain are within the sediment plume of the Atchafalaya River and are stable or accreting. The creation of large borrow pits within the proposed shell mining area could trap sediment, reduce the rate of downdrift shoreline accretion and allow erosive forces to dominate. Therefore, dredging restrictions should be established to ensure that Atchafalaya River sediment that normally would be deposited along the Chenier Plain shoreline is not trapped in borrow pits.

The secondary impacts of shell dredging could lessen the success of projects being implemented under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) which seek to protect and restore vegetated coastal wetlands. Significant federal and state resources are being expended to repair a breach and stabilize the shoreline of Point au Fer and to restore the hydrology of interior marshes. If project implementation accelerates wave-driven shoreline erosion on Point au Fer or disrupts nearshore sediment delivery, the benefits of CWPPRA projects would be compromised.

In view of the above, the NMFS recommends that the project be modified to reduce the risk of potentially significant impacts to shallow nearshore areas and emergent wetlands. Specific consideration should be given to increasing the width of the no dredging zone and regulating excavation depths, thereby reducing the disruption of shallow water habitats and avoiding impacts to the shoreline and marshes of Point au Fer. We also recommend that alternatives be evaluated and appropriate measures taken to ensure that sedimentation processes along Marsh Island and the eastern Chenier Plain not be adversely impacted by shell dredging.

We appreciate your consideration of our comments.

Sincerely,

Rickey N. Rubottom
Andreas Mager, Jr.
Assistant Regional Director
Habitat Conservation Division

Your concern about the effect of shell dredging on sediment dynamics in the nearshore GOM is noted. Please see our comments at Response to Mr. Harold Schoeffler, letter dated May 27, 1993 (see page F-17).

Your concern about the effect of shell dredging on the fate of CWPPRA projects is noted. Please see our response to a similar concern at Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company, letter dated May 12, 1993 (see page F-5).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6

1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

JULY 2 1985

Colonel Michael Diffley
District Engineer
U.S. Army Engineer District, New Orleans
ATTN: CELMN-PD-RS (Mr. Robert Bosenberg)
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Diffley:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, we have completed our review of the Corps of Engineer's (COE) Draft Environmental Impact Statement (EIS) for the proposed oyster shell dredging in Gulf of Mexico waters, within three miles of the coast in St. Mary and Terrebonne Parishes, Louisiana.

The proposed action consists of permitting the dredging of subsurface oyster reefs from portions of the nearshore Gulf of Mexico within the Louisiana coast. Approximately 1.6 million cubic yards (MCY) of shell material would be removed annually in the 51,272 acres of open water defined as the project area. Shell surveys indicate a 5 to 8 year reserve of shell based on the production of 1.6 MCY per year.

Two alternatives, including the no-action alternative, have been analyzed in the Draft EIS. The preferred alternative is identified as the issuance of permits under Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Clean Water Act to the permit's applicant, Louisiana Dredging Company. The applicant would be utilizing cutterhead dredging to remove fossilized reef shell materials from below the mud line of the water bottom. Basic shell dredging operations consist of exploration, extraction, processing, and transportation.

While our review of the Draft EIS has not identified any significant adverse environmental impacts associated with shell dredging in the proposed project area, we do note some minor deficiencies in the discussion of certain relevant issues. These deficiencies are the basis for our concerns with the proposed action. Therefore, we offer the following comments for your consideration when preparing the Final EIS.

NO COMMENT NECESSARY

■ A 404 (b)(1) analysis was not included in the Draft EIS. EPA feels that this analysis is an essential part of the District's decision-making process for this proposed action. The CEQ Regulations for Implementing NEPA encourages the combining of documents and environmental review procedures so that all such procedures run concurrently rather than consecutively. As compliance with the 404 (b)(1) Guidelines must be demonstrated prior to issuing a 404 permit, the Final EIS should document compliance and provide the analysis for the general public.

■ The Draft EIS indicates that there is no data available on living oyster reefs in the project area. However, there is a proposed restriction on dredging 1,000 feet from live reefs. It is unclear how this condition can be met if the locations of live reefs are not known. At present, through the Barataria\ Terrebonne National Estuary Program, a live oyster reef survey is being conducted. This survey will include portions of the project area. We would suggest that oyster shell dredging be delayed in the proposed project area until information on live reefs is obtained and their locations are mapped.

■ The Draft EIS states that offsite mitigation is prescribed under the Louisiana Department of Natural Resources (LDNR) regulations. These mitigation measures involve construction of shell reefs. A reef approximately one acre in size has been built in West Cote Blanche Bay. Has the success of this mitigation measure been evaluated? What additional mitigation measures or restrictions are now prescribed for oyster shell dredging off coastal waters by either the state or federal resource agencies?

■ Hypoxia is a common occurrence within the project area during summer months. Dredging and associated turbidity, may exacerbate lower dissolved oxygen concentrations and reduce pH levels. Placing seasonal restrictions on dredging activities during high hypoxia conditions may mitigate for some of the local impacts associated with oyster shell dredging.

■ To permit the dredging and processing of buried shell reefs may be considered as an irretrievable commitment of a resource. Section 1502.16 of the CEQ Regulations for Implementing NEPA, requires that EISs include discussion of natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures.

■ The eventual exhaustion of oyster shell reefs along Louisiana's coast will require the consideration of alternative materials (limestone, sand, etc.) in the foreseeable future. The Final EIS should include an alternative that considers the combined use of other alternative materials, thereby extending the availability of oyster shell reserves for a longer period.

US Environmental Protection Agency, letter dated July 2, 1993

A Section 404 (b)(1) Guidelines compliance evaluation will be performed as part of the regulatory review and analysis of the proposed action. That evaluation will draw from the EIS and both the 404 and EIS will be available to the decision maker and the public, assuring that our actions comply with NEPA.

Delay dredging until live oyster reefs are mapped

We do not believe the applicant should be required to survey the entire 50,000+ acres as a prerequisite to permit issuance. We agree that living reefs above the mud line should not be dredged or indirectly affected adversely by dredging. But, the applicant has requested a Federal permit inclusive of the restrictions imposed by Louisiana's Coastal Management Division in the state-issued Coastal Use Permit to avoid impacting living oysters. Our understanding is that the state restriction was based upon the demonstrated lateral effects caused by dredges (as described in our EIS). However, we could include in the conditions of the permit, should it be issued, advisory language alerting the permittee to the availability of the live oyster surveys you reference that could supplement surveys performed in advance of dredging.

Success of reef creation as mitigation & what federal and state conditions/mitigation measures are in effect in near shore coastal waters

Oysters are a species subject to the administrative authority of the Louisiana Department of Wildlife and Fisheries (LDWF). When a state coastal use permit is required for a proposed action, the LDWF comments to the Louisiana Department of Natural Resources, Coastal Restoration Division (LCRD) which is authorized to issue, deny or condition state coastal use permits and require mitigation for impacts to resources over which the state has singularly specific regulatory authority. At this point in time, we view the mitigation provisions imposed by LCRD to create reefs as a mitigatory effort as a state-level matter.

The applicant's permit application is for a project that includes the constraints and limitations that currently apply to shell dredging activities in the coastal bays previously authorized by Federal permit. Many of those Federal permit conditions were imposed to mitigate adverse environmental impacts. Should our Section 404 and/or public interest reviews reveal a Federal interest regarding oysters, then the merits of adopting the existing state-imposed mitigation as a condition to a Federal permit, or developing additional mitigation, will be considered. The results of such an analysis will be presented in the Record of Decision.

Hypoxia

Your comment about the occurrence of hypoxia is noted. We acknowledge that dead zones (areas of low or no dissolved oxygen in the water) occur in nearshore GOM waters. However, they occur for reasons unrelated to shell dredging. While dissolved oxygen levels are reduced in the immediate area of an operating dredge, dredging itself will not create dead zones.

The applicant's permit application is for a project that includes the constraints and limitations that currently apply to shell dredging activities in the coastal bays previously authorized by Federal permit. Many of those Federal permit conditions were imposed to mitigate adverse environmental impacts. Should our Section 404 and/or public interest reviews reveal a Federal interest regarding hypoxia, then the merits of adopting additional restrictive federal permit conditions limiting the places and/or times where dredging may or may not occur will be considered. The results of such an analysis will be presented in the Record of Decision.

Alternative materials

Your comment is noted. We believe the EIS properly acknowledges the existence of alternative materials (Table 1), discusses the constraints on the use of those materials (EIS Section 2) and informs the reader that there are situations where the use of alternative materials has, and by inference, can and should be expected to arise (EIS Section 2).

In accordance with EPA's policies, we have rated this Draft EIS as EC-2 (Environmental Concerns--Insufficient Information). As identified above, our concerns are primarily based on the need for additional information on mitigation requirements and/or restrictions associated with the proposed permit, identification of live shell reefs in the project area, and compliance with the 404(b)(1) Guidelines.

Our classification will be published in the Federal Register according to our responsibilities to inform the public of our views on the proposed Federal action, under Section 309 of the Clean Air Act.

We appreciate the opportunity to participate in the review process of this Draft EIS. Please contact Ms. Yvonne Vallette of my staff at (214) 655-6420 if we may provide further explanation of our concerns or comments. We request that you send our office (2) copies of the Final EIS at the same time that it is sent to the Office of Federal Activities, U.S. Environmental Protection Agency, 401 M Street S.W., Washington, D.C. 20460.

Sincerely yours,



Joe D. Winkle
Acting Regional Administrator

cc: Amy Hashimoto, Office of Federal Activities

THIS PAGE LEFT BLANK



United States Department of the Interior



OFFICE OF THE SECRETARY
OFFICE OF ENVIRONMENTAL AFFAIRS
POST OFFICE BOX 649
ALBUQUERQUE, NEW MEXICO 87103

ER 93/321

May 26, 1993

Colonel Michael Diffley,
District Engineer
ATTN: CELMN-PD-RS
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Diffley:

The U.S. Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) for Oyster Shell Dredging in Gulf of Mexico Waters, St. Mary and Terrebonne Parishes, Louisiana. The following comments are provided for your consideration.

General Comments

The DEIS is well written and contains fairly detailed descriptions of oyster shell dredging operations and their history in coastal Louisiana. Although the document addresses most of the environmental impacts resultant from implementation of the proposed alternatives, the following comments note sections that need further information for adequate assessment.

Specific Comments

Page 25, paragraph 1: The discussion of shell reserves may be misleading because only proven reserves are quantified. The volume of proven reserves was used to predict the life of shell-dredging industry in the project area and to discuss economic and environmental impacts of the proposed activity. However, the DEIS notes that proven reserves represent only a small percentage of the expected total reserves. Because accurate estimates of total reserves are important to adequately assess environmental impacts, the DEIS should include estimates of total shell reserves or an explanation of why they are not included in the analysis.

Page 50, figure 8: While pipelines are found in the project area, no discussion is included about protection or relocation of these lines. If no action is needed, this should be stated. If protective actions will be required, then the DEIS should include these plans and the possible environmental impacts.

Page 86, paragraph 1: The DEIS should address the potential for, and discuss impacts of, damage to fishing gear that may become entangled in newly dredged areas (i.e. pits).

Page EIS-25, Paragraph 1

Comment noted and text amended in Section EIS 3.1.

Page EIS-50, Figure 8

Comment noted and text amended to include a discussion about how pipelines and shell dredging affect each other in Section EIS 3.4.1.

Page EIS-86, para 1

Comment noted and text amended.

Page 112, paragraph 3: Although the DEIS acknowledges that the project area is used by recreational fishermen from several parishes, it concludes that the proposed shell dredging will have no affect on existing recreational uses. This apparent contradiction should be rectified.

Thank you for the opportunity to review and provide comment on this document.

Sincerely,



Glenn B. Sekavec
Acting Regional Environmental Officer

Page EIS-112, para 3

Our conclusion was that shell dredging would have no significant impact on the recreational use of the area. We did not say it would have no effect.



RICHARD P. LIEYOUS
ATTORNEY GENERAL

State of Louisiana
DEPARTMENT OF JUSTICE
Baton Rouge
70804-9005

June 4, 1993

Mr. R. H. Schroeder, Jr.
Chief, Planning Division
New Orleans District Corp of Engineers
P. O. Box 60267
New Orleans, LA 70160-0267

Attention: Planning Division Environmental Analysis Branch

Subject: Draft EIS Oyster Shell Dredging
Seaward of Atchafalaya Bay

Dear Mr. Schroeder:

The Louisiana Attorney General's office submits the following comments to the DEIS for the captioned activity:

1. Hydrologic Impacts

The continued dredging of oyster shell as proposed in these waters will create deep troughs which can increase wave heights with a corresponding increase in shoreline erosion in the captioned area. We are all aware of the serious problem Louisiana faces with regard to its coastal wetland losses. Activity which exacerbate said land loss must be studied more carefully and thoroughly before an irreversible decision -- such as the one proposed -- is made. The EIS for the project neither adequately analyzes these adverse environmental consequences, nor considers alternatives or modifications to the proposed activity to ameliorate or eliminate these impacts.

The troughs created by this dredging activity will cause the stratification of seawater with resulting low oxygen "dead zones". Adequate alternatives to the project which could minimize or eliminate this adverse environmental impact should be addressed thoroughly.

Changes in natural hydrology caused by the presence of the "troughs" could impact natural waterflows, increasing scouring and/or sediment deprivation in the nearby coastal bay islands. This could cause their ultimate disappearance through erosion. The EIS does not adequately address this potential for harm to Louisiana's coastal marsh islands, and what their loss could mean to the adjacent coastal ecosystem.

STATE AGENCIES:

Department of Justice, Office of the Attorney General - Letter dated June 4, 1993

Hydrologic Impacts

Comment noted. However, we disagree for the reasons given in our response to a similar concern expressed by Coastal Environments on behalf of St. Mary Land & Exploration Company, especially our response at Impact on Hydrology, Tides and Wave Energies.

Comment noted. Dead zones are areas where there is little or no oxygen dissolved in the water. Dead zones occur in nearshore GOM waters for reasons unrelated to shell dredging. While dissolved oxygen levels may be somewhat reduced in the immediate area of an operating dredge, dredging itself will not create dead zones.

We believe the EIS does adequately address your concern about the fate of coastal bay islands. We acknowledge that if dredging and "trough" creation were to occur in extreme close proximity to islands, we agree that they could be adversely affected, in a fashion similar to the sediment starvation that typically occurs on the down current shoreline of a jetty. However, we don't believe this will be a problem for two reasons: 1) dredging that close to coastal islands is already precluded by state provision; and, 2) the enormous amounts of sediment naturally in the project area. (See our comments at Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company, letter dated May 12, 1993(see page F-5) Response to Mr. Harold Schoeffler, letter dated May 27, 1993(see page F-17).

Your comment about "troughs" is noted. Please see our comments at Response to Coastal Environments, Inc., for St. Mary Land & Exploration Company, letter dated May 12, 1993, Response to Mr. Harold Schoeffler, letter dated May 27, 1993.

Mr. R. H. Schroeder, Jr.
June 4, 1993
Page 2

2. Economic Impacts

The economic information provided indicates that numerous jobs and other positive economic benefits will be derived from the proposed activity. However, it should be noted that such companies are not merely shell dredging companies, but construction material supply companies. As such, often the economic/jobs creation benefits referenced are attributable to other activities of the company in addition to the shell dredging. The information provided does not adequately assess jobs directly related solely to the dredging of shell in the proposed project area and jobs lost if the shell dredging in the project area is not allowed but other sources of construction material are acquired by the company and supplied to its customers.

3. Mitigation

The DEIS points to Louisiana's mitigation requirements imposed upon Dravo Basic Materials by the Louisiana Department of Natural Resources and the Louisiana Department of Wildlife and Fisheries under previous leases. However, this mitigation (little if any of which has been performed to date) was required under the state lease and state law. Any mitigation required under § 404 guidelines or other federal requirements should be separate and distinct from that required under a lease agreement between the State of Louisiana and its dredging lessee. The federal government should impose additional mitigation requirements under its separate legal authority to enhance and/or supplement any required by Louisiana.

4. Biological Impacts

The DEIS states that no impact to sea turtles, such as the Kemp's Ridley are anticipated. However, studies done off the Florida Atlantic coast revealed high turtle mortalities due to navigation maintenance dredging in that area. Further study of impacts to Kemp's Ridley and other sea turtles should be undertaken and alternatives to the proposed activity should be considered to avoid sea turtle mortality.

Economic Impacts

It is true that many of these companies are in the business of supplying construction material. Louisiana Dredging Company, however, is exclusively in the business of oyster shell dredging and maintains no alternate material yards.

Mitigation

In permit cases involving an EIS, mitigation cannot be concluded within the EIS process. In such cases, the Corps of Engineers - New Orleans District is obligated to address mitigation during the EIS process, during the Section 404 Guidelines compliance evaluation, and as part of the public interest review. Thus, the Corps may well determine that mitigation is necessary, and that mitigation may include incorporating conditions recommended by other agencies if and when such action is necessary. The reason for requiring mitigation is set forth in the Record of Decision.

Biological Impacts

Appendix E of the DEIS is the record of consultation between the Corps of Engineers - New Orleans District, and the National Marine Fisheries Service's Protected Species Office regarding Federally protected species within the proposed project area. That agency agreed with our determinations that the species for which they are responsible, which includes the Kemp's ridley sea turtle, would not be adversely affect by the proposed action. Their determination was not contingent upon performing additional studies, as you suggest, or evaluating any additional alternatives.

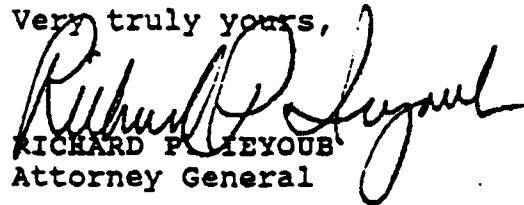
Mr. R. H. Schroeder, Jr.
June 4, 1993
Page 3

The impacts of oyster shell dredging to the coastal ecosystem of the proposed project area are ultimately impacts to Federal trustee resources -- including Federal Marine Fisheries and Migratory Waterfowl. Even though such federal resources are renewable, they are so only insofar as their respective nursery and staging areas -- the project area's coastal ecosystem -- are preserved.

It is this office's recommendation that further study of impacts, alternatives and specific mitigation activities should be undertaken.

Thank you for the opportunity to comment on the draft EIS. I would appreciate a copy of the final EIS when it is available.

Very truly yours,


RICHARD P. L'EOUA
Attorney General

Your comment about impacts to renewable resources is acknowledged.

Your final comment, a recommendation to do more studies of impacts, alternatives and specific mitigation activities, is noted. However, we believe we have sufficient information and insight about the impacts and consequences of the proposed action at this time to conduct the remaining evaluations preparatory to making a final decision on the requested permit.

State of Louisiana



Joe L. Herring
Secretary

Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, LA 70898-9000
(504) 765-2800

Edwin W. Edwards
Governor

May 14, 1993

District Engineer
ATTN: CELMN-PD-RS
U.S. Army Engineer District
Post Office Box 60267
New Orleans, LA 70160-0267

RE: Review of DEIS- Oyster Shell Dredging in Gulf of Mexico Waters

Dear District Engineer:

The Department has reviewed the DEIS for oyster shell dredging in Gulf of Mexico waters. The DEIS indicates that shell dredging has no direct longterm, adverse environmental impact on water quality or fish and wildlife resources. The staff concludes that the DEIS is accurate in matters relating to fish and wildlife. The following Department comments should be noted:

Regulation of the industry is important for the protection of the fish and wildlife resources.

Portions of Zones 8 and 9 are heavily utilized by recreational fishermen and commercial shrimpers. This general area is one of the peak areas along the Louisiana coast for white shrimp production. The shrimping occurs in the nearshore area, especially when inside waters are closed to shrimping. The recreational finfishing activity is also concentrated in the restricted area along the Attorney General's Line. Changes in turbidity may temporarily impact this activity.

Proposed dredging would result in troughs 300 feet wide and up to 20 feet deep. These troughs may make shrimp trawling in the area difficult. Disturbed sediments may cause the trawl boards to bury or physically clog the net with soft mud and shell fragments. The DEIS states that dredging would have little effect on water transport as dredged holes would not be continuous. These troughs, if extensive, may locally alter long shore currents, as well as direction and amplitude of wave trains. The dredging company should provide contour maps and selected cross section maps of the area prior to, during and after dredging.

Because of the possibility of accelerating erosion rates, particularly in

Louisiana Department of Wildlife and Fisheries, Letter dated May 14, 1993

Comment noted.

The importance of the commercial and recreational fishery are acknowledged in this report in EIS Sections 3.6.2.1.1. and 3.7.1.1. The effects of localized short term turbidity increases on shrimp and finfish are acknowledged in EIS Sections 3.6.2.1.2. and 3.7.1.2.

Because sediment from the dredging process including the reef overburden is directed back into the cut, the resultant troughs are usually less than 20 feet deep. Data examined from the last two years of dredging activity in adjacent areas show that most reefs were 10 feet or less in thickness in the center with 10 feet or less of sediment overburden. Reefs dredged are not continuous and troughs fill rapidly. Monthly submission of bottom contours of dredge cuts are made to the LDWF. The dredge cuts are surveyed with a recording fathometer immediately after the cut is completed.

the Point Au Fer area as a result of current and wave alteration, the dredged areas should be monitored. The area under consideration is adjacent to a previously large, almost continuous shell reef which was located between Point Au Fer to within a few miles of Marsh Island. Portions of these reefs still exist (Fishermen's Reef or Nickle Reef and Rabbit Island Pass). This massive reef system was previously dredged and very little documentation is available as to where it was dredged, how much shell was extracted and who did the dredging.

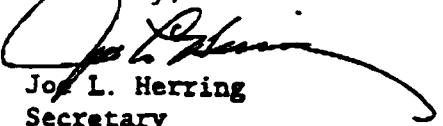
Impacts on phytoplankton production may have been underestimated. Data from studies that are being conducted in the Four League Bay area indicate that there may be some nitrogen limitation in the area. Reduced nitrogen species in the sediments may produce localized "blooms". It is not clear from the assessment whether this was evaluated.

The benthic recovery will be rapid, but in some cases, alteration of the bottoms invite colonization by a different suite of organisms that may tend to exclude original populations.

Dredged shell continues to be an important material for use in shoreline stabilization, reef nourishment, and rookery construction.

Thank you for the opportunity to review the DEIS.

Sincerely,


Joe L. Herring
Secretary

cc: W.S. "Corky" Perret
Leroy Caubarreaux

The applicant has requested a permit to dredge shell in the area depicted in Figures 1 and 7 of the EIS (EIS-2 and EIS-48). This area excludes the reef complex between Point au Fer and Marsh Island. Additionally , to avoid the potential for any adverse impacts, the applicant has agreed not to conduct dredging operations within one mile of the existing Point Au Fer Island shoreline. This agreement was made with St. Mary Land Company by letter dated May 20, 1993.

The potential for short term phytoplankton "blooms" was addressed in EIS Section 3.6.1.1.2.

Immediately after the cut is made, a shift in community species richness and equitability is likely to occur. Opportunistic species will colonize the new substrate quickly and in large numbers. As the cut fills and the association of organisms stabilizes, some species will appear, some species may disappear or at least decrease in numbers. These differences should diminish over time as evidenced by the benthos identified in previous dredge cuts in the GSRI study. This study, referenced in Section EIS 3.6.2.2.1., reports fauna typical of the soft bottom, oligohaline/mesohaline communities found in Louisiana waters.



State of Louisiana
Department of Environmental Quality



Edwin W. Edwards
 Governor

Kai David Midboe
 Secretary

MAY 14 1993

U. S. Army Corps of Engineers
 New Orleans District
 Planning Division
 P. O. Box 60267
 New Orleans, LA 70160-0267

Attention: Mr. R. H. Schroeder, Jr.

Gentlemen:

RE: Draft Environmental Impact Statement for Oyster Shell Dredging in Gulf of Mexico Waters, St. Mary and Terrebonne Parishes, Louisiana.

We have received the above referenced document, which was sent to the Governor's Office. Louisiana Dredging Company submitted this draft EIS as part of their application for Water Quality Certification for this project, and the Office of Water Resources of this Department issued Water Quality Certification for this work in September, 1992. We have no further comments on this proposal, other than that the work be conducted in accordance with the conditions set forth in the Water Quality Certification.

Thank you for the opportunity to review this proposal.

Sincerely,

Kai David Midboe
 Secretary

KDM/LMW

c: Office of the Governor (00021207)
 William A. Kucharski (WAK 93-525)

F-81

OFFICE OF WATER RESOURCES P.O. BOX 82215 BATON ROUGE, LOUISIANA 70884-2215

AN EQUAL OPPORTUNITY EMPLOYER



Louisiana Department of Environmental Quality, Letter dated May 14, 1993

We note your recommendation that the proposed work be done in compliance set forth in the Water Quality Certification. A water quality certification is a required prerequisite to issuance of the requested Federal permits. Even if we determine it is appropriate to issue this permit, we can't unless the applicant furnishes us with proof that the state has issued its water quality certification.



EDWIN W. EDWARDS
GOVERNOR

JOHN F. ALES
SECRETARY

DEPARTMENT OF NATURAL RESOURCES
May 4, 1993

District Engineer
Attn: CELMN-PD-RS
U.S. Army Engineer District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Subject: Draft Environmental Impact Statement (DEIS), Oyster
Shell Dredging in Gulf of Mexico Waters, St. Mary
and Terrebonne Parishes, Louisiana.

Dear Colonel Diffley:

My staff has reviewed the referenced document transmitted to this Office by Mr. R. H. Schroeder, Jr.'s March 29, 1993, letter soliciting comments, which follow.

- Overall, the document appears to adequately address the issue of shell dredging in the project area.
- On Page EIS-47 it states that estimated shell reserves in the proposed project area can support the industry for an additional 1-2 years. Other references in the document state that there are 5-8 years of shell production in the proposed project area. This discrepancy should be corrected or explained.

I greatly appreciate the opportunity to comment on this DEIS. Should you have questions regarding these comments please feel free to call Mr. Jim Holcombe of my staff at (504) 342-7591.

Sincerely,
A handwritten signature in black ink, appearing to read "David M. Soileau".
David M. Soileau
Assistant Secretary

F-83

Louisiana Department of Natural Resources, letter dated May 4, 1993

Comment noted and text amended.